

**REPORT OF
AIR POLLUTION SOURCE TESTING
OF AN ETHYLENE OXIDE EMISSION-CONTROL SYSTEM
OPERATED BY STERIGENICS U.S., LLC.
IN QUEENSBURY, NEW YORK
ON SEPTEMBER 16, 2021**

Submitted to:

**NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION
P.O. Box 220
232 Hudson Street
Warrensburg, New York 12885-0220**

Submitted by:

**STERIGENICS US, LLC.
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NYDEC Permit Number 5-5344-00029/0001-1

Prepared by:

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September 29, 2021

ECSi

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September 16, 2021

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1.0 INTRODUCTION

On Thursday, September 16, 2021, ECSi performed air pollution source testing of an ethylene oxide (EtO) emission-control system operated by Sterigenics U.S., LLC. in Queensbury, New York. The control system tested was a Ceilcote packed tower scrubber emission-control system, which is currently used to control emissions from eleven EtO sterilizer vacuum pumps. The purpose of the testing program was to demonstrate continued compliance with EPA requirements under the current National Emissions Standards for Hazardous Air Pollutants (NESHAP), and with the conditions established in the permit (Number 5-5344-00029/0001-1) granted to Sterigenics US, LLC. by the New York Department of Environmental Conservation (NYDEC).

2.0 EQUIPMENT

The EtO gas-sterilization system is comprised of eleven commercial sterilizers, all discharging through liquid-ring vacuum pumps to a packed-tower acid scrubber emission control device. In compliance with NYDEC and USEPA requirements, and all aeration room vents are discharged to a Donaldson EtO Abator catalytic oxidizer emission control device. In compliance with NYDEC requirements, all chamber exhaust vents (“backvents”) are discharged to the same Donaldson EtO Abator catalytic oxidizer emission control device.

The gas-sterilization and emission-control equipment consists of the following:

- Eleven Gas Sterilizers, one 26-pallet chamber (3003 cubic feet), four 13-pallet (1333 cubic feet), four 8-pallet (two: 1155 cubic feet; two: 1200 cubic feet), and two 3-pallet (350 cubic feet) capacity, each comprised of a steam-heated sterilization chamber, a recirculating vacuum pump chamber evacuation system, a chamber backvent valve, and a fugitive emissions exhaust hood;
- Five Aeration Rooms, three 48-pallet (11,340 cubic feet), one 685-pallet (189,642 cubic feet), and one 3764 cubic feet capacity, each comprised of a heated aeration room and an aeration room exhaust system.

Sterilizer vacuum pump emissions are controlled by:

- One Ceilcote packed tower acid scrubber, Model SPT-42-120, equipped with a bed of No. 1 Tellerette packing, a 5000-gallon reaction tank/reservoir, a secondary 5000-gallon reaction tank, a scrubber fluid recirculation system, and an exhaust blower.

Sterilizer backvent and aeration emissions are controlled by:

- One Donaldson EtO Abator System, operated at approximately 6,000 SCFM, equipped with a prefilter, a steam heater, an exhaust gas heat exchanger, a reactive catalyst bed, and an exhaust blower.

3.0 TESTING

EtO source testing was conducted in accordance with the procedures outlined in USEPA CFR40, Part 63.365. EtO emissions monitoring was conducted simultaneously at the inlet and outlet of the Ceilcote scrubber during the first chamber evacuation of the sterilizer exhaust phase of one of the eleven sterilizers. A total of three exhaust-phase test runs were performed.

During the first chamber evacuation of the exhaust phase, inlet EtO emissions were determined using the Ideal Gas Law and the chamber conditions at the beginning and at the end of the first chamber evacuation. During the first chamber evacuation of the exhaust phase, outlet EtO emissions were determined using direct source sample injection into the GC. In accordance with Subpart O 63.365, CARB Method 431 was used for measurement of ethylene oxide concentrations in the source gas streams tested.

All exhaust phase testing was conducted during normal process load conditions, but with an empty sterilization chamber to facilitate the performance of multiple test runs. The testing program was conducted in accordance with the procedures outlined in the following sections.

4.0 RULE/COMPLIANCE REQUIREMENTS

The EtO gas-sterilization and emission-control system at Sterigenics U.S., LLC. was tested to demonstrate compliance with the current federal EPA National Emissions Standard for Hazardous Air Pollutants (NESHAP) for ethylene oxide, and with the requirements specified in the NYDEC Permit. Testing is being performed to demonstrate compliance with the chamber vacuum vent control requirements. The current testing will demonstrate compliance with the following requirements:

- The sterilizer exhaust phase (post exposure vacuum pulses) emissions must be vented to control equipment with an EtO emission-reduction efficiency of at least 99 % by weight (USEPA NESHAP requirement).
- The sterilizer exhaust phase (post exposure vacuum pulses) emissions must be vented to control equipment with an EtO emission-reduction efficiency of at least 99.9 % by weight (NYDEC permit condition).

Testing is required to demonstrate compliance with these requirements. Source testing of the emission-control device is required initially, and may be required periodically thereafter.

5.0 TEST METHOD REFERENCE

5.1 INTRODUCTION

EtO source testing was conducted in accordance with the procedures outlined in USEPA CFR40, Part 63.365. EtO emissions monitoring was conducted simultaneously at the inlet and outlet of the Ceilcote scrubber during the first chamber evacuation of the sterilizer exhaust phase of one of the eleven sterilizers. A total of three exhaust-phase test runs were performed.

During the first chamber evacuation of the exhaust phase, inlet EtO emissions were determined using the Ideal Gas Law and the chamber conditions at the beginning and at the end of the first chamber evacuation. During the first chamber evacuation of the exhaust phase, outlet EtO emissions were determined using direct source sample injection into the GC. In accordance with Subpart O 63.365, CARB Method 431 was used for measurement of ethylene oxide concentrations in the source gas streams tested. All procedures were followed, as documented in the following sections.

All exhaust phase testing was conducted during normal process load conditions, but with an empty sterilization chamber to facilitate the performance of multiple test runs.

Operation and documentation of process conditions was performed by personnel from Sterigenics U.S., LLC. using existing monitoring instruments installed by the manufacturer of the equipment to be tested. In accordance with NYDEC requirements, and the procedures established in USEPA 40 CFR, Part 63.365, Subpart O, scrubber liquor level and glycol concentration were recorded.

5.2 VOLUMETRIC FLOW MEASUREMENT

Exhaust gas flow at the outlet of the scrubber was determined by EPA Method 2C using a standard pitot tube and an inclined-oil manometer. Sampling ports were located upstream of the system exhaust blower, far enough from any flow disturbances to permit accurate flow measurement.

Temperature measurements were obtained from a type K thermocouple and thermometer attached to the sampling probe. Exhaust gas composition was air and <0.001% EtO, with a stack gas molecular weight of 28.51 and a standardized ambient level moisture content of 3 percent by volume.

5.3 CONTROL EFFICIENCY AND MASS EMISSIONS MEASUREMENT

During the first chamber evacuation of the sterilizer exhaust phase, the inlet mass emissions of EtO were determined using the procedures outlined in CFR40, Part 63.365. This method allows the determination of the mass of EtO vented to the inlet of the scrubber through calculations based on the Ideal Gas Law and using the conditions (pressure, temperature, volume) of the sterilization chamber immediately after it has been charged with sterilant gas, and upon conclusion of the first chamber evacuation of the exhaust phase.

The mass of EtO vented to the inlet of the scrubber during the first chamber evacuation of the exhaust phase was determined by calculating the mass of EtO present in the chamber after the first chamber evacuation and subtracting it from the mass of EtO present in the chamber after it has been charged with sterilant gas. The mass of EtO present in the chamber was calculated using Equation 1, shown below in Section 5.9.

During the first chamber evacuation of the sterilizer exhaust phase, EtO emissions from the outlet were determined using direct source sample injection into the GC. The mass of EtO emitted from the outlet was determined using Equation 2, shown below in Section 5.9. Mass-mass control-efficiency of EtO during the sterilizer exhaust phase was calculated by comparing the mass of EtO vented to the system inlet to the mass of EtO vented from the system outlet.

During the sterilization chamber exhaust phase, vented gas was analyzed by an SRI, Model 8610, portable gas chromatograph (GC), equipped with the following: dual, heated sample loops and injectors; dual columns; and dual detectors. A photoionization detector (PID) was used to quantify low-level EtO emissions at the scrubber outlet.

5.4 SAMPLE TRANSPORT

Source gas was pumped to the GC at approximately 1000 cubic centimeters per minute (cc/min) from the sampling ports through a heated Teflon® sample line, with a nominal volume of approximately 75 cubic centimeters (cc) and an outer diameter of 0.25 inch.

5.5 GC INJECTION

Source-gas samples were then injected into the GC which was equipped with two heated sampling loops, each containing a volume of approximately 2cc and maintained at 100 degrees Celsius (C). Injections occurred at approximately one to two-minute intervals. Nitrogen was the carrier gas for the PID.

5.6 GC CONDITIONS

The packed columns for the GC were both operated at 90 degrees C. The columns were stainless steel, 6 feet long, 0.125-inch outer diameter, packed with 1 percent SP-1000 on 60/80 mesh Carbopack B. Any unused sample gas was vented from the GC system back to the inlet of the control device being tested.

5.7 CALIBRATION STANDARDS

The PID was calibrated for low-range ppmv level analyses using gas proportions similar to the following:

- 1) 100 ppmv EtO, balance nitrogen
- 2) 50 ppmv EtO, balance nitrogen (audit gas)
- 3) 10 ppmv EtO, balance nitrogen
- 4) 1 ppmv EtO, balance nitrogen

Each of these calibration standards was in a separate, certified manufacturer's cylinder. Copies of the calibration gas laboratory certificates are attached as Appendix F. Calibration procedures are described in detail in Section 7.2 of this report.

5.8 SAMPLING DURATION

Exhaust phase EtO measurements were taken for the entire duration of the first chamber evacuation, which was approximately 20 minutes. This encompassed a total sampling duration of approximately 20 minutes for each exhaust phase test run.

5.9

CONTROL-EFFICIENCY/MASS-EMISSIONS CALCULATIONS

The following equation was used to calculate mass of EtO discharged to the inlet of the emission-control system during the first chamber evacuation of the sterilizer exhaust phase:

EQUATION 1:

$$W_c = W_{ci} - W_{cf}$$

Where:

W_c = Weight of EtO discharged from the sterilization chamber to the emission-control system during the first chamber evacuation, pounds

$$W_{ci} = (mw)(p)(P)(V)/(R)(T)$$

(and W_{cf})

Where:

W_{ci} = Weight of EtO present in the sterilization chamber before the first chamber evacuation, pounds

W_{cf} = Weight of EtO present in the sterilization chamber after the first chamber evacuation, pounds

MW = Molecular weight of EtO, 44.05 lb/mol

p = Percent of EtO in chamber
= W_s/W_i

Where:

W_s = Scale-measured weight of EtO charged into sterilization chamber

W_i = Calculated weight of EtO charged into sterilization chamber (@ 100%)

P = Sterilization chamber pressure (after charging/at the end of the 1st evac), psia

V = Sterilization chamber volume, ft³

R = Gas constant, 10.73 psia·ft³/mol·°R

T = Sterilization chamber temperature (after charging/at the end of the 1st evac), °R

Note: Standard conditions are 68°F and 1 atm.

Mass emissions of EtO during the exhaust phase were calculated using the following equation:

EQUATION 2:

$$\text{MassRate} = (\text{VolFlow})(\text{MolWt})(\text{ppmv EtO}/10^6)/(\text{MolVol})$$

Where:

MassRate = EtO mass flow rate, pounds per minute

VolFlow = Corrected volumetric flow rate, standard cubic feet per minute at 68 degrees F

MolWt = 44.05 pounds EtO per pound mole

ppmv EtO = EtO concentration, parts per million by volume

10^6 = Conversion factor, ppmv per "cubic foot per cubic foot"

MolVol = 385.32 cubic feet per pound mole at one atmosphere and 68 degrees F

Results of the control-efficiency testing are presented in Section 8.0 and in Table 1.

6.0 TEST SCENARIO

During exhaust phase testing, each sterilizer was tested during normal process load conditions, but with an empty sterilization chamber to facilitate the performance of multiple test runs. A total of three exhaust-phase test runs were performed to verify the performance of the emission-control device. Testing was conducted with an effort to offer minimal disruption to the Sterigenics production schedule. The testing schedule was as follows:

- 1) Testing equipment was set up and calibrated.
- 2) An empty-chamber cycle was started in one of the larger sterilizers. This sterilizer was isolated for test use and designated as a test chamber.
- 3) An empty-chamber cycle was started in another of the larger sterilizers. This sterilizer was isolated for test use and designated as a test chamber.
- 4) An empty-chamber cycle was started in another of the larger sterilizers. This sterilizer was isolated for test use and designated as a test chamber.
- 5) Exhaust Phase Test Run #1 was conducted. Sampling was performed at outlet of the scrubber during the first chamber evacuation of the test chamber. During the performance of the test, only the sterilizer used for the test was allowed to discharge to the scrubber.
- 6) Exhaust Phase Test Run #2 was conducted. Sampling was performed at outlet of the scrubber during the first chamber evacuation of the test chamber. During the performance of the test, only the sterilizer used for the test was allowed to discharge to the scrubber.
- 7) Exhaust Phase Test Run #3 was conducted. Sampling was performed at outlet of the scrubber during the first chamber evacuation of the test chamber. During the performance of the test, only the sterilizer used for the test was allowed to discharge to the scrubber.
- 8) Post calibration check was performed, testing equipment was packed.

7.0 QA/QC

7.1 FIELD TESTING QUALITY ASSURANCE

At the beginning of the test, the sampling system was leak checked at a vacuum of 15 inches of mercury. The sampling system was considered leak free when the flow indicated by the rotameters fell to zero.

At the beginning of the test, a system blank was analyzed to ensure that the sampling system was free of EtO. Ambient air was introduced at the end of the sample line and drawn through the sampling system line to the GC for analysis. The resulting chromatogram also provided a background level for non-EtO components (i.e. ambient air, carbon dioxide, water vapor) which are present in the source gas stream due to the ambient dilution air which is drawn into the emission-control device, and due to the destruction of EtO by the emission-control device which produces carbon dioxide and water vapor. This chromatogram, designated AMB, is included with the calibration data in Appendix A.

7.2 CALIBRATION PROCEDURES

The GC system was calibrated prior to testing. The pre-test calibration procedure included triplicate injections of each concentration of calibration gas, for each detector. The lowest concentration of calibration gas was injected 7-10 times for the detector used at the outlet sampling point, as part of the method detection limit (MDL) determination for the test. The MDL calculations were performed using a spreadsheet provided to ECSi by Ned Shappley of the USEPA Measurement Technology Group, in accordance with USEPA Method 301. The resulting calibration data was entered into the Peaksimple II analytical software, and a calibration curve for the test was established for each detector.

A gas cylinder of similar composition as the calibration gases, but certified by a separate supplier, was used to verify calibration gas composition and GC performance (audit gas). This gas was used as a calibration check at the midpoint of the test, and at the conclusion of the test to verify that the Peaksimple calibration curve for each detector was still accurate within 10% of the mean values established in the multipoint calibration, or a new calibration curve must be generated.

All calibration gases and support gases used were of the highest purity and quality available. A copy of the laboratory certification for each calibration gas is attached as Appendix F.

8.0 TEST RESULTS

The Ceilcote Scrubber was found to have an average EtO control efficiency of 99.994 percent. In accordance with state and federal requirements, sterilizer vacuum pump discharge streams must be vented to control equipment with an EtO emission-reduction efficiency of at least 99.9 percent. The Ceilcote Scrubber met this requirement.

The test results are summarized in Table 1. This tables include results for EtO control efficiency of and mass emissions from the emission-control system. Chromatograms and chromatographic supporting data are attached as Appendices A through D.

TABLES

TABLE 1
COMPLIANCE TESTING RESULTS
ETHYLENE OXIDE CONTROL EFFICIENCY AND MASS EMISSIONS
OF AN ETHYLENE OXIDE EMISSION CONTROL SYSTEM
OPERATED BY STERIGENICS U.S., LLC.
IN QUEENSBURY, NEW YORK
ON SEPTEMBER 16, 2021

EXHAUST PHASE - STERILIZER VACUUM VENT

<u>Run #</u>	<u>Chamber Number</u>	<u>Stack Flow (dscfm) (1)</u>	<u>Average Outlet Conc. (ppm) (2)</u>	<u>Outlet EtO Mass Flow (lbs/min) (3)</u>	<u>Minutes/ Cycle</u>	<u>Outlet EtO Mass Emissions (lbs)</u>	<u>Inlet EtO Mass Emissions (lbs)</u>	<u>EtO Control Efficiency (%)</u>
1	1	857	0.008	0.0000008	20	0.0000157	50.6	99.99997
2	2	859	0.098	0.0000096	21	0.0002024	48.2	99.99958
3	E	855	6.53	0.0006380	16	0.0102074	56.6	99.98196
Average EtO Control Efficiency:								99.994

Notes: (1) - DSCFM = dry standard cubic feet per minute
(2) - PPM = parts per million by volume
(3) - LBS/MIN = EtO emissions, pounds per minute

APPENDICES

APPENDIX A
Calibration Data

Detection Limit Study

Step 1 : Prepare and analyze at least seven standards prepared at or near the estimated detection limit

Step 2 : Record and calculate the standard deviation of the replicate measurements.

EtO Std Conc. (ppm): 1.08

Analysis Number	1	2	3	4	5	6	7	8	9	10
Result	15.98	16.04	16.07	16.06	16.04	16.01	15.96	16.09	15.99	16.05

Calculated Standard Deviation = 0.0423

Average: 16.03

Step 3 : Determine the Method Detection Limit (MDL) by multiplying the student T value appropriate for 99% confidence level and the standard deviation estimate with in n-1 degrees of freedom

Number of Replicates	7	8	9	10
T-values	3.143	2.998	2.896	2.821

Method Detection Limit (as peak area): = 0.1193

Method Detection Limit (as concentration): = **0.0080 ppm EtO**

EtO Calibrations

Site: Sterigenics - Queensbury, NY

Date: 9/16/2021

INLET - FID

ppm	0	1.08	10.6	100	1,000	10,080
Area 1	0					
Area 2	0					
Area 3	0					
AVG.	0	#DIV/0!	#DIV/0!	#DIV/0!		

AUDIT DIRECT	AUDIT BIAS
52.0	52.0
READS	READS
52.3	52.2
Dev. 0.6%	0.4%

OUTLET - PID

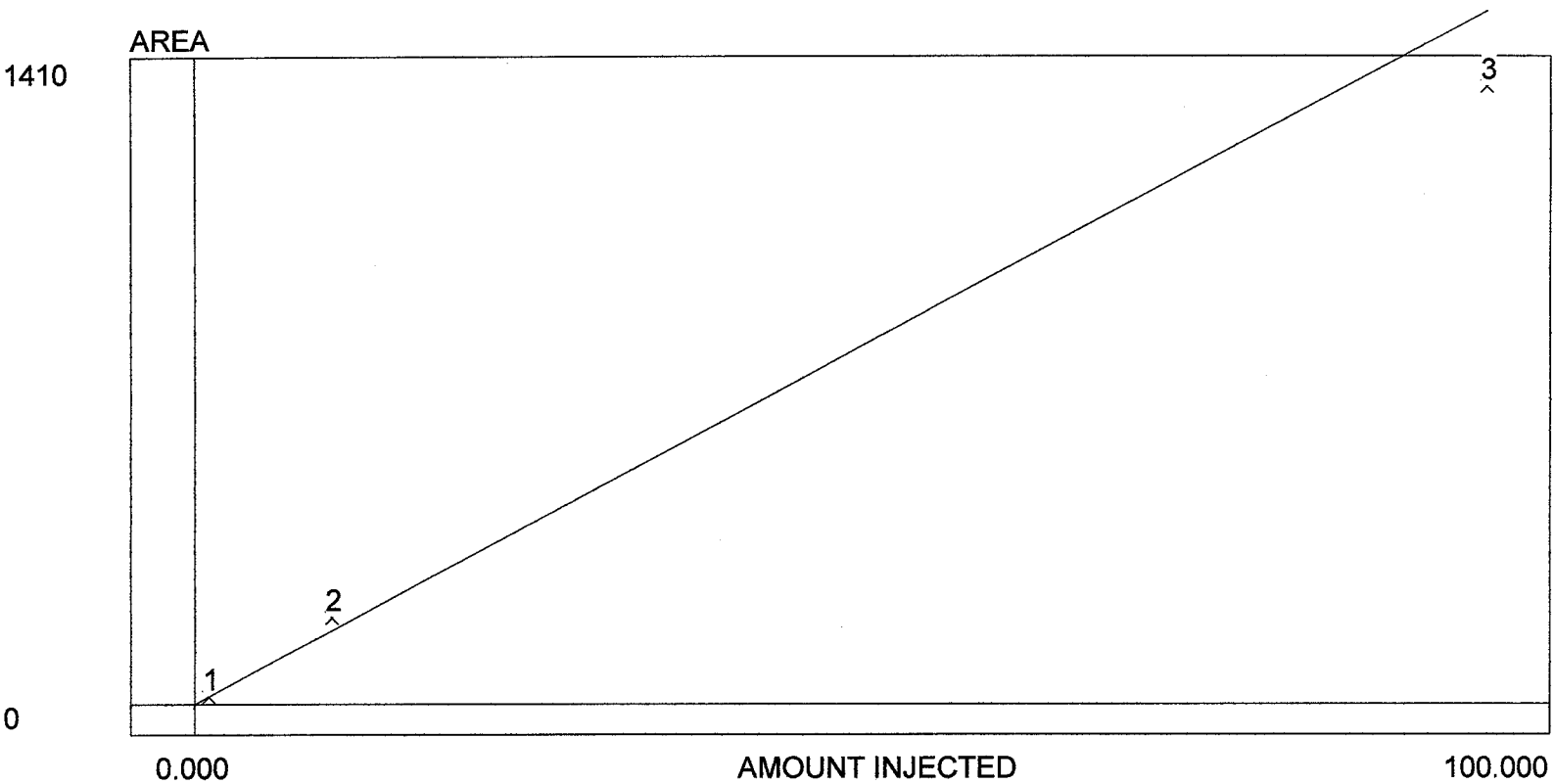
ppm	0	1.08	10.6	100
Area 1	0		201	1410
Area 2	0		195	1410
Area 3	0		194	1410
AVG.	0	16.03	197	1410

AUDIT DIRECT	AUDIT BIAS
52.0	52.0
READS	READS
52.4	51.9
Dev. 0.8%	-0.2%

MID CAL			
	PPM	READS	Dev.
INLET			#DIV/0!
OUTLET			#DIV/0!

FINAL CAL			
	PPM	READS	Dev.
INLET	52.0		-100.0%
OUTLET	52.0	52.2	0.4%

Peak	Name	Start	End	Calibration	Int.Std	Units
1	Dead Vol / Air	0.000	0.280		0.000	
2	Ambient H2O	0.280	0.440		0.000	
3	Ethylene Oxide	0.440	0.540	C:\peak454-64bit\0.000\2Sppm\B2021.CAL		
4	Acetaldehyde	0.540	1.000		0.000	



Avg slope of curve: 15.84

Y-axis intercept: 0.00

Linearity: 1.00

Number of levels: 3

SD/rel SD of CF's: 2.4/15.2

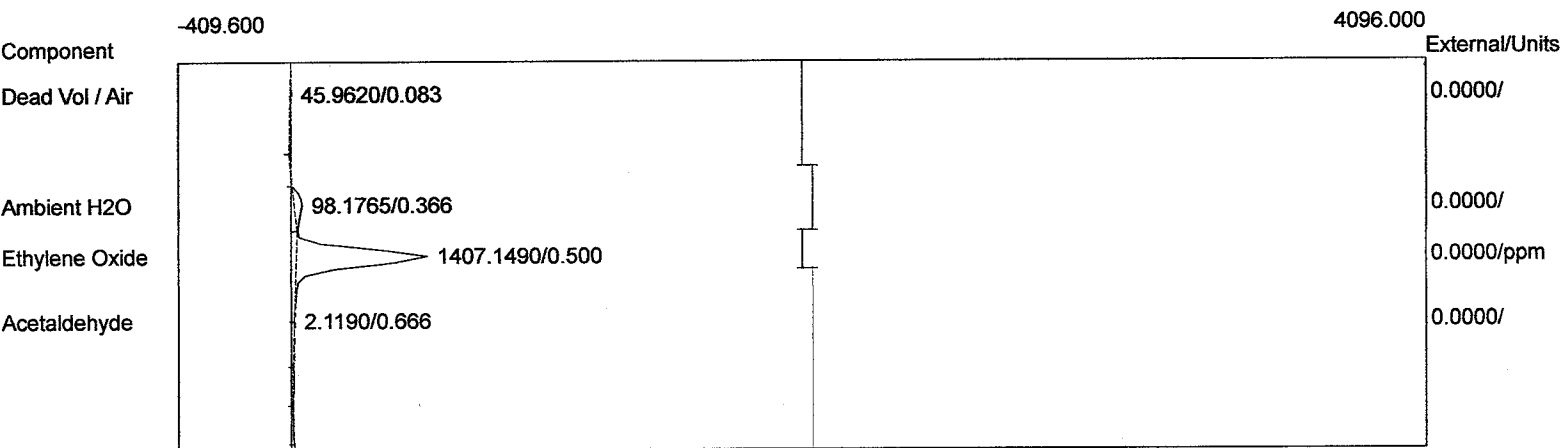
Y=15.8425X

r2: 0.9990

Last calibrated: Thu Sep 16 09:19:14 2021

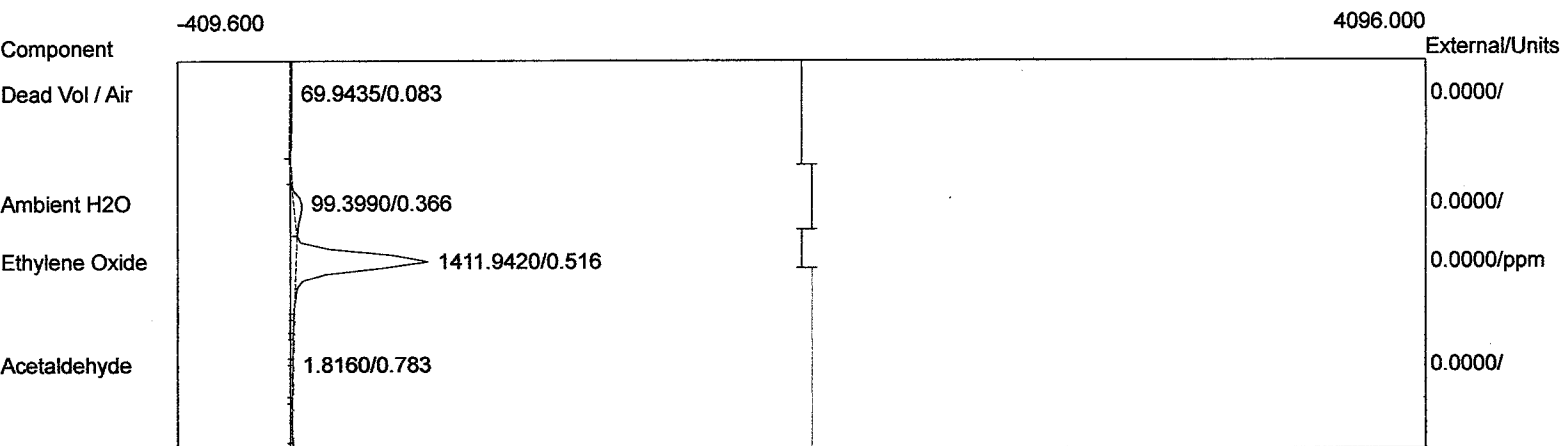
Lvl.	Area/ht.	Amount	CF	Current	Previous #1	Previous #2
1	16.030	1.080	14.843	16.030	N/A	N/A
2	197.000	10.600	18.585	197.000	N/A	N/A
3	1410.000	100.000	14.100	1410.000	N/A	N/A

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 08:22:07
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C01.CHR (c:\peak359)
 Sample: 100 ppm EtO std
 Operator: D. Kremer



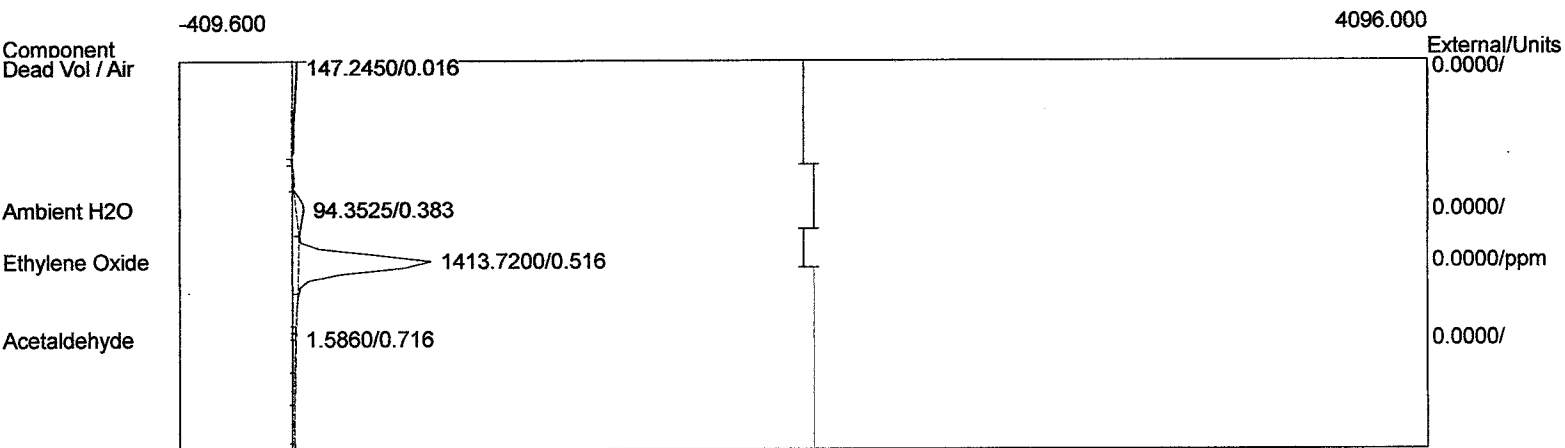
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	45.9620	0.0000	
Ambient H2O	0.366	98.1765	0.0000	
Ethylene Oxide	0.500	1407.1490	0.0000	ppm
Acetaldehyde	0.666	2.1190	0.0000	
		1553.4065	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 08:23:52
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C02.CHR (c:\peak359)
 Sample: 100 ppm EtO std
 Operator: D. Kremer



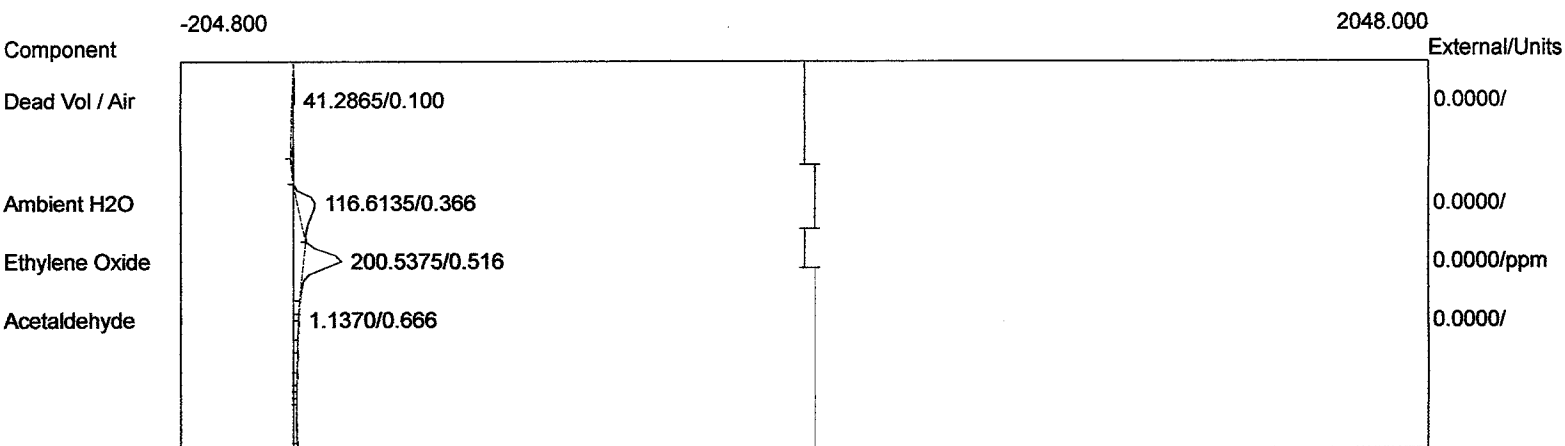
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	69.9435	0.0000	
Ambient H2O	0.366	99.3990	0.0000	
Ethylene Oxide	0.516	1411.9420	0.0000	ppm
Acetaldehyde	0.783	1.8160	0.0000	
		1583.1005	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 08:25:24
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C03.CHR (c:\peak359)
 Sample: 100 ppm EtO std
 Operator: D. Kremer



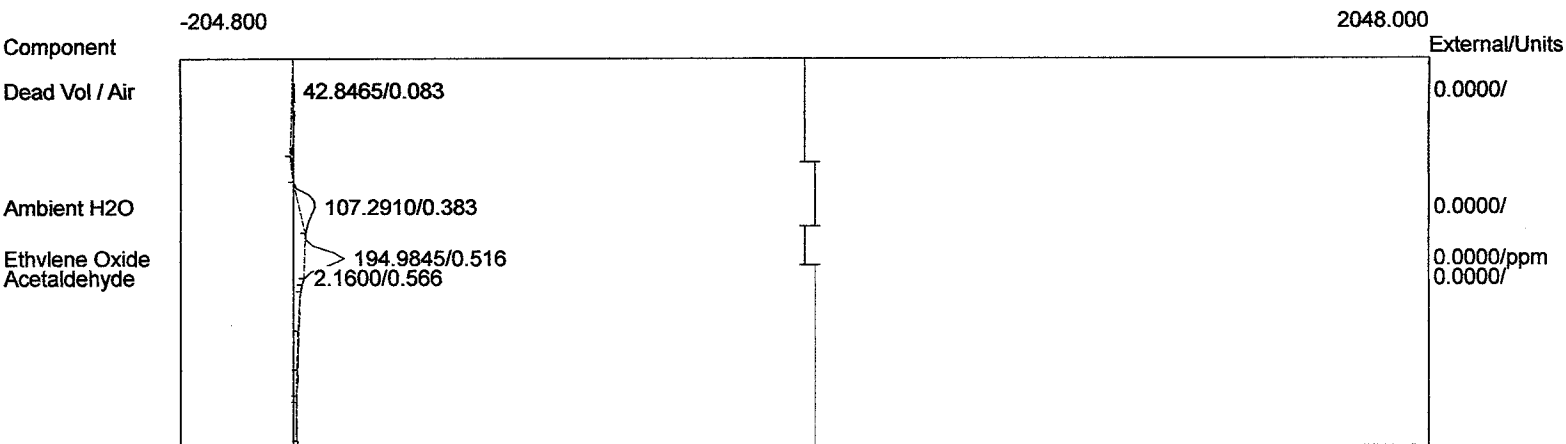
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	147.2450	0.0000	
Ambient H2O	0.383	94.3525	0.0000	
Ethylene Oxide	0.516	1413.7200	0.0000	ppm
Acetaldehyde	0.716	1.5860	0.0000	
		1656.9035	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 08:29:48
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C04.CHR (c:\peak359)
 Sample: 10.6 ppm EtO std
 Operator: D. Kremer



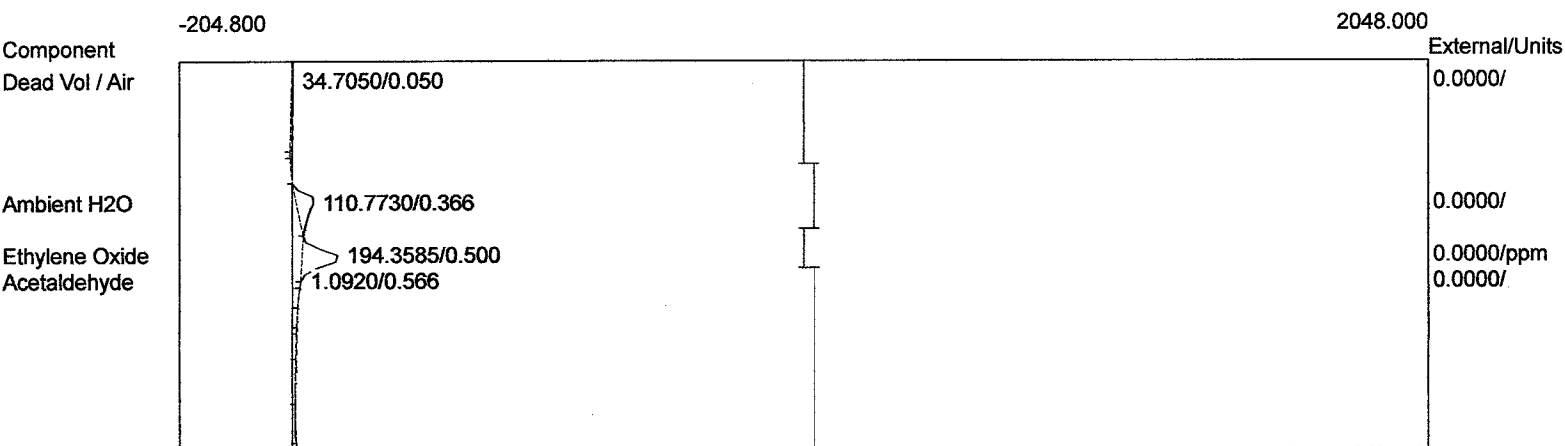
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	41.2865	0.0000	
Ambient H2O	0.366	116.6135	0.0000	
Ethylene Oxide	0.516	200.5375	0.0000	ppm
Acetaldehyde	0.666	1.1370	0.0000	
		359.5745	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 08:33:29
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C05.CHR (c:\peak359)
 Sample: 10.6 ppm EtO std
 Operator: D. Kremer



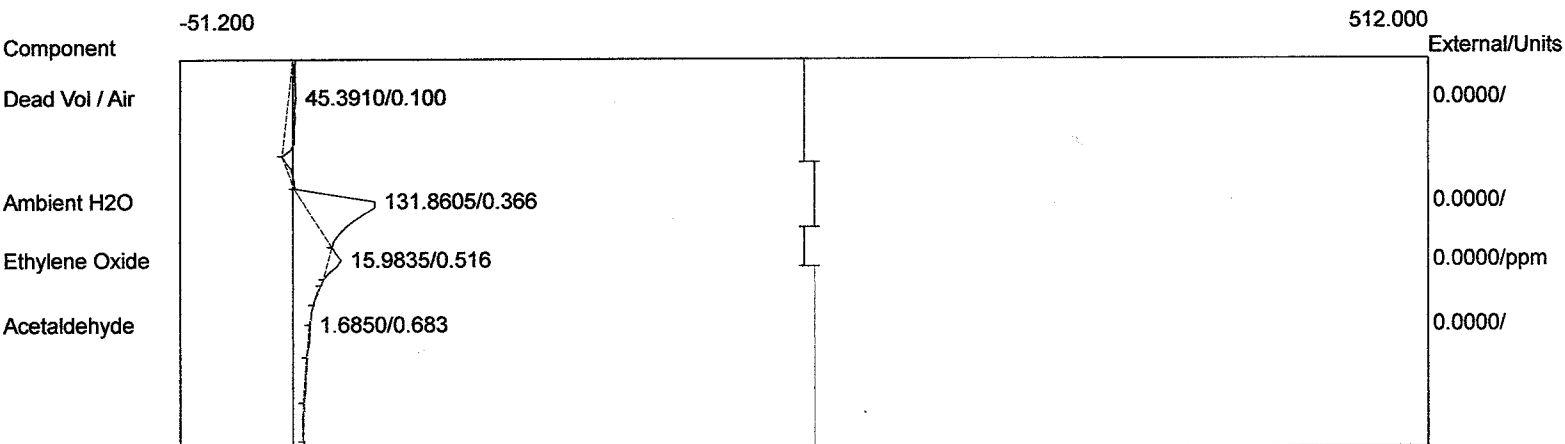
Component	Retention	Area	External	Units
Dead Vol / Air	0.083	42.8465	0.0000	
Ambient H2O	0.383	107.2910	0.0000	
Ethylene Oxide	0.516	194.9845	0.0000	ppm
Acetaldehyde	0.566	2.1600	0.0000	
		347.2820	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 08:36:13
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C06.CHR (c:\peak359)
 Sample: 10.6 ppm EtO std
 Operator: D. Kremer



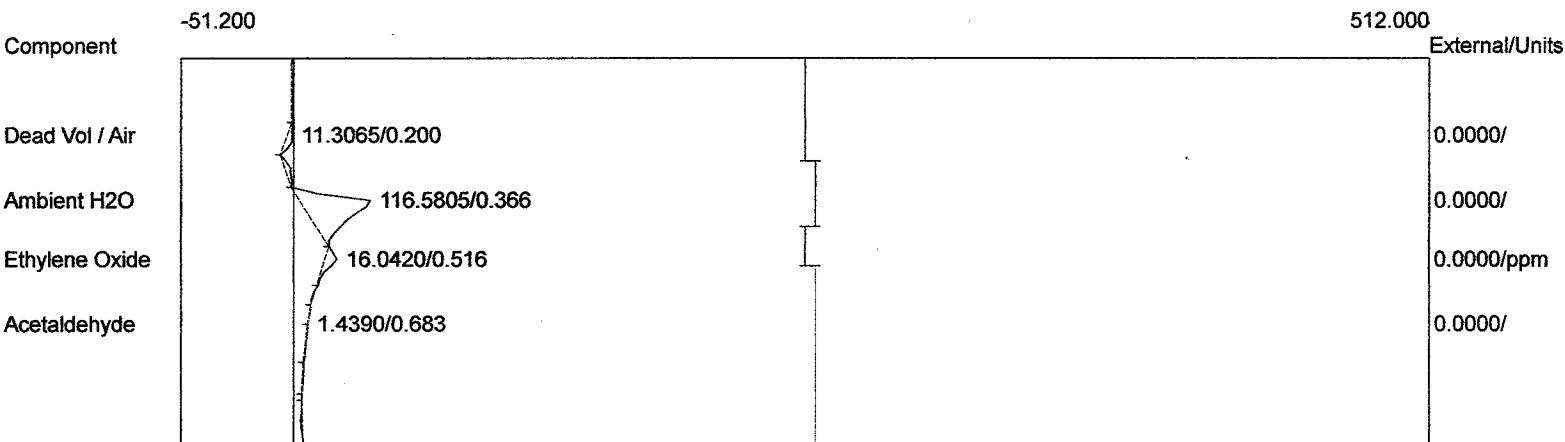
Component	Retention	Area	External	Units
Dead Vol / Air	0.050	34.7050	0.0000	
Ambient H2O	0.366	110.7730	0.0000	
Ethylene Oxide	0.500	194.3585	0.0000	ppm
Acetaldehyde	0.566	1.0920	0.0000	
		340.9285	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 08:38:33
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C07.CHR (c:\peak359)
 Sample: 1.08 ppm EtO std
 Operator: D. Kremer



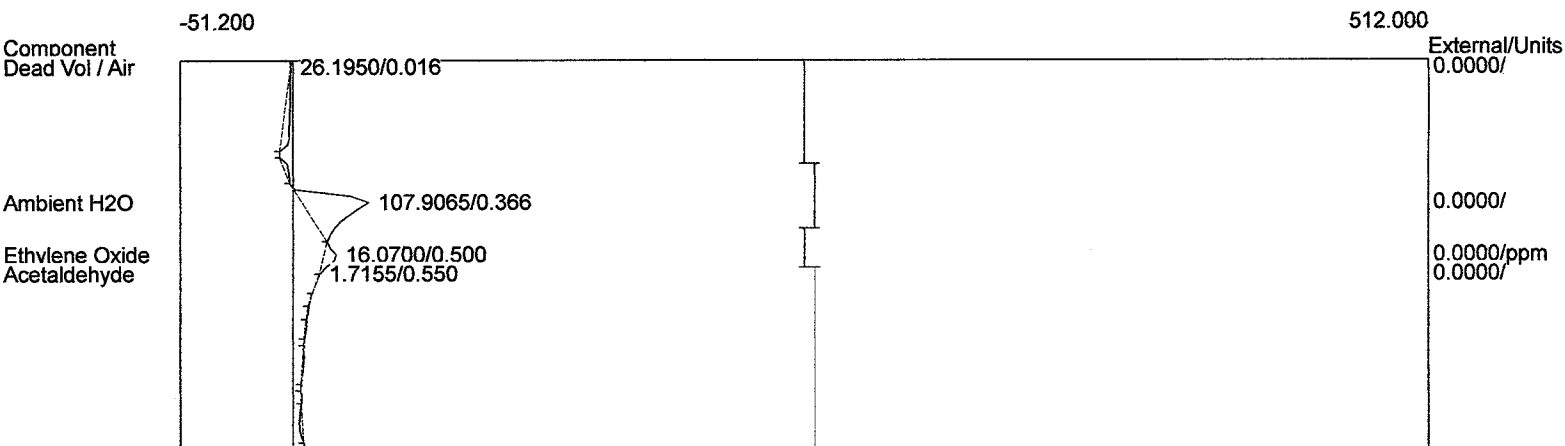
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	45.3910	0.0000	
Ambient H2O	0.366	131.8605	0.0000	
Ethylene Oxide	0.516	15.9835	0.0000	ppm
Acetaldehyde	0.683	1.6850	0.0000	
		194.9200	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 08:43:08
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C08.CHR (c:\peak359)
 Sample: 1.08 ppm EtO std
 Operator: D. Kremer



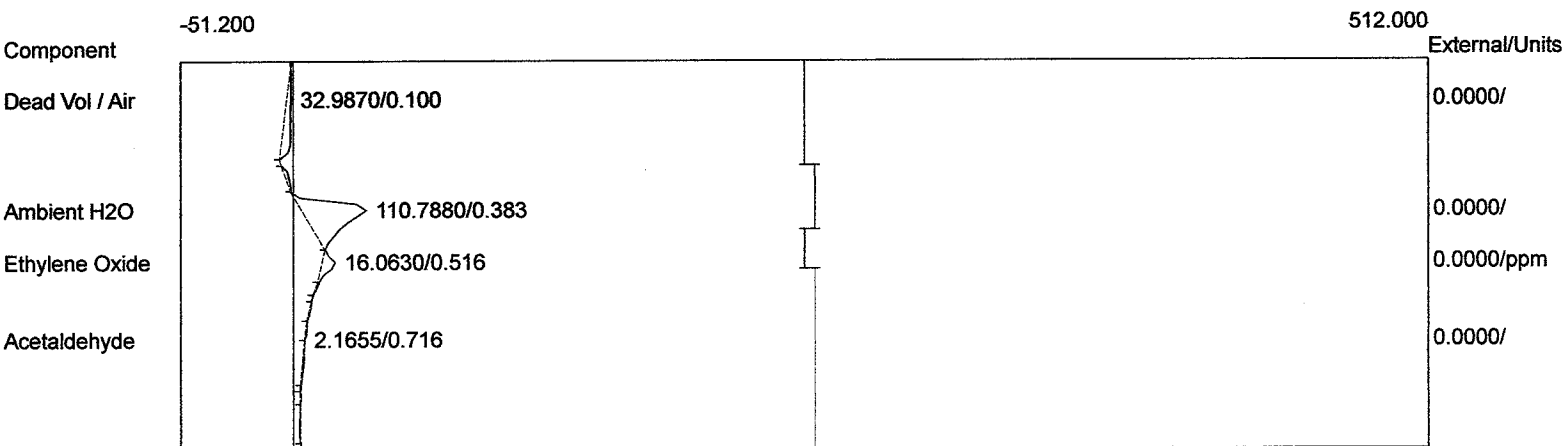
Component	Retention	Area	External	Units
Dead Vol / Air	0.200	11.3065	0.0000	
Ambient H2O	0.366	116.5805	0.0000	
Ethylene Oxide	0.516	16.0420	0.0000	ppm
Acetaldehyde	0.683	1.4390	0.0000	
		145.3680	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 08:47:53
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C09.CHR (c:\peak359)
 Sample: 1.08 ppm EtO std
 Operator: D. Kremer



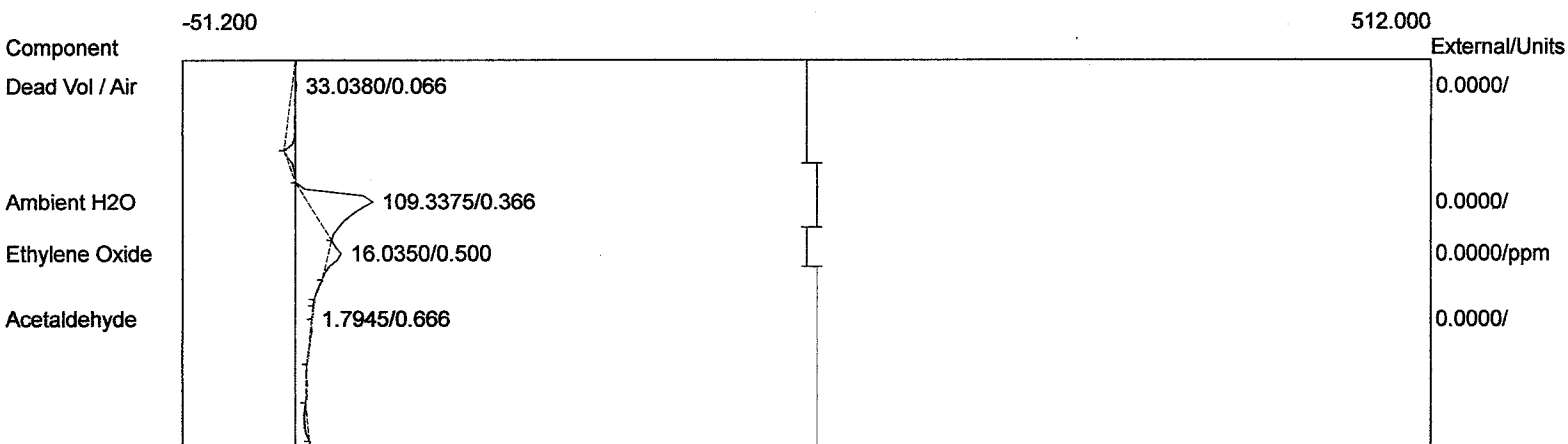
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	26.1950	0.0000	
Ambient H2O	0.366	107.9065	0.0000	
Ethylene Oxide	0.500	16.0700	0.0000	ppm
Acetaldehyde	0.550	1.7155	0.0000	
		151.8870	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 08:50:53
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C10.CHR (c:\peak359)
 Sample: 1.08 ppm EtO std
 Operator: D. Kremer



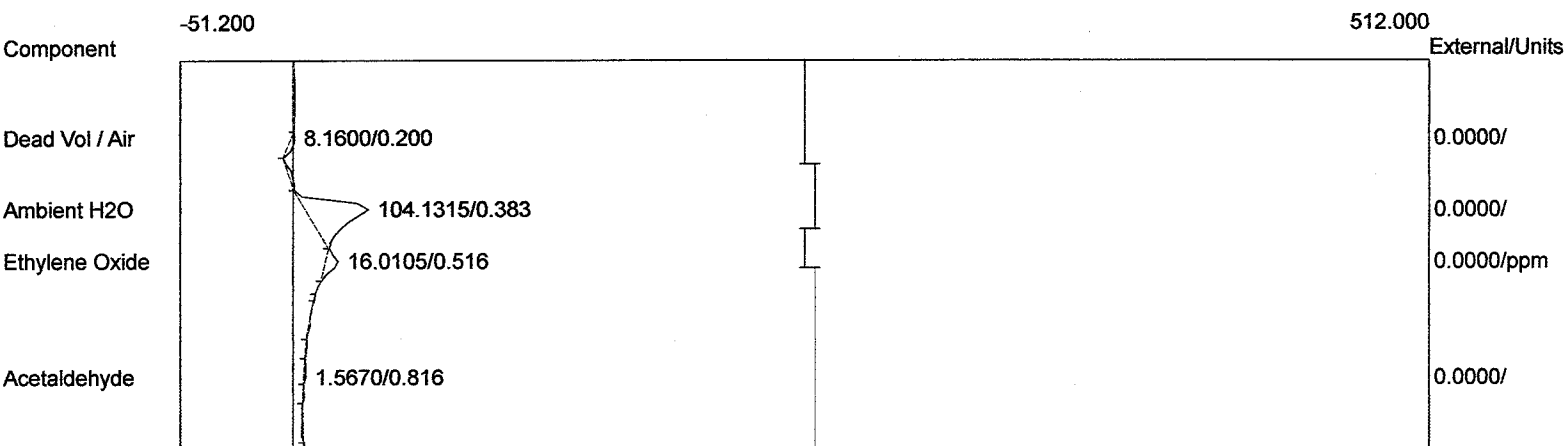
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	32.9870	0.0000	
Ambient H2O	0.383	110.7880	0.0000	
Ethylene Oxide	0.516	16.0630	0.0000	ppm
Acetaldehyde	0.716	2.1655	0.0000	
		162.0035	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 08:54:55
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C11.CHR (c:\peak359)
 Sample: 1.08 ppm EtO std
 Operator: D. Kremer



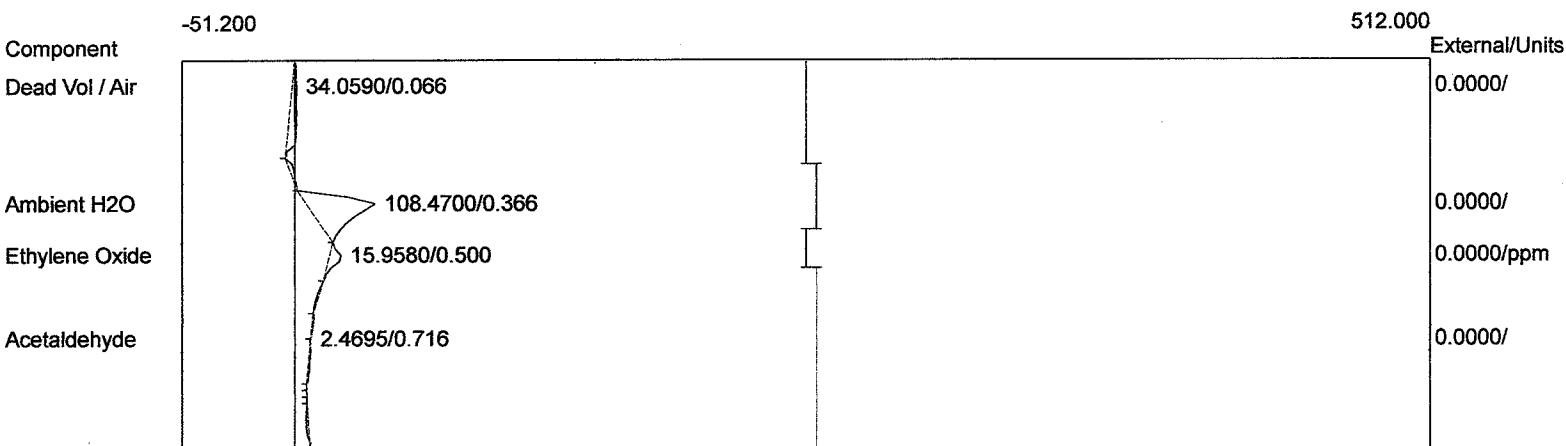
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	33.0380	0.0000	
Ambient H2O	0.366	109.3375	0.0000	
Ethylene Oxide	0.500	16.0350	0.0000	ppm
Acetaldehyde	0.666	1.7945	0.0000	
		160.2050	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 08:57:24
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C12.CHR (c:\peak359)
 Sample: 1.08 ppm EtO std
 Operator: D. Kremer



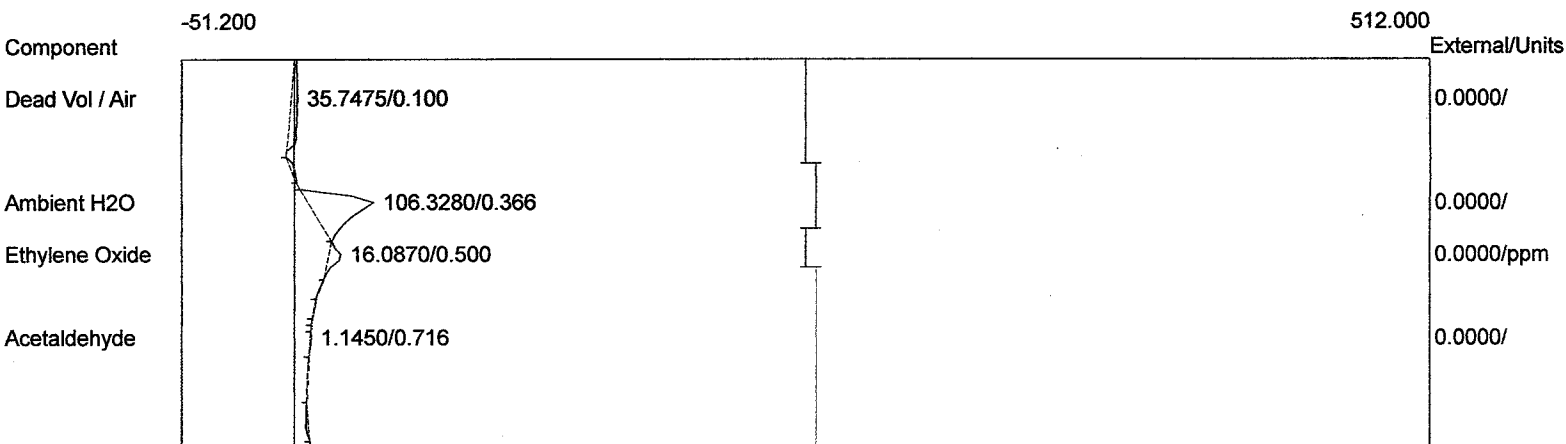
Component	Retention	Area	External	Units
Dead Vol / Air	0.200	8.1600	0.0000	
Ambient H2O	0.383	104.1315	0.0000	
Ethylene Oxide	0.516	16.0105	0.0000	ppm
Acetaldehyde	0.816	1.5670	0.0000	
		129.8690	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 09:02:33
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C13.CHR (c:\peak359)
 Sample: 1.08 ppm EtO std
 Operator: D. Kremer



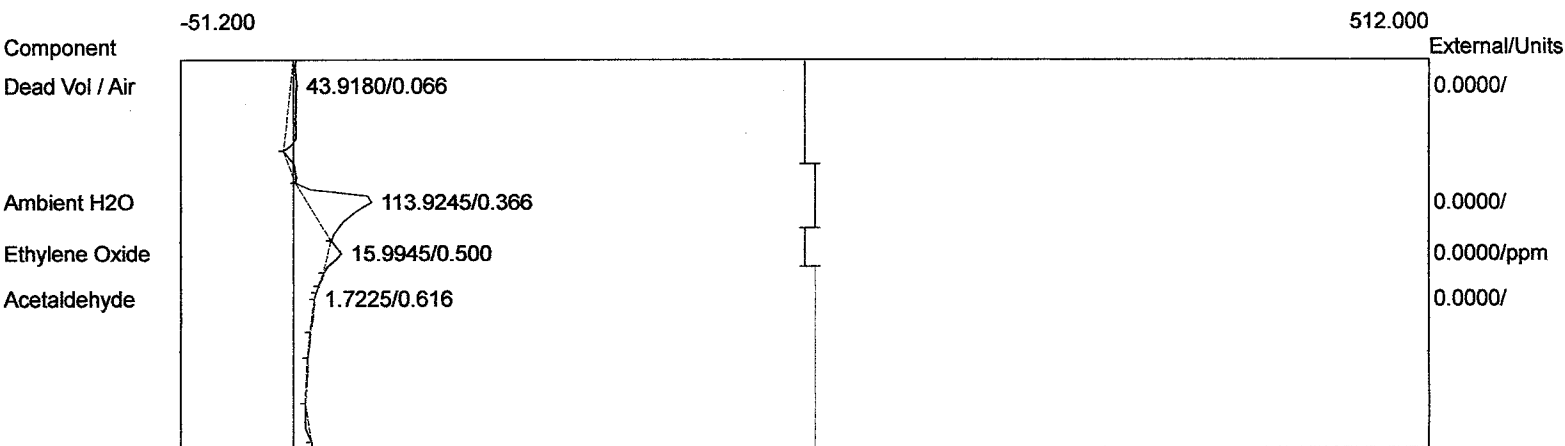
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	34.0590	0.0000	
Ambient H2O	0.366	108.4700	0.0000	
Ethylene Oxide	0.500	15.9580	0.0000	ppm
Acetaldehyde	0.716	2.4695	0.0000	
		160.9565	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 09:06:12
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C14.CHR (c:\peak359)
 Sample: 1.08 ppm EtO std
 Operator: D. Kremer



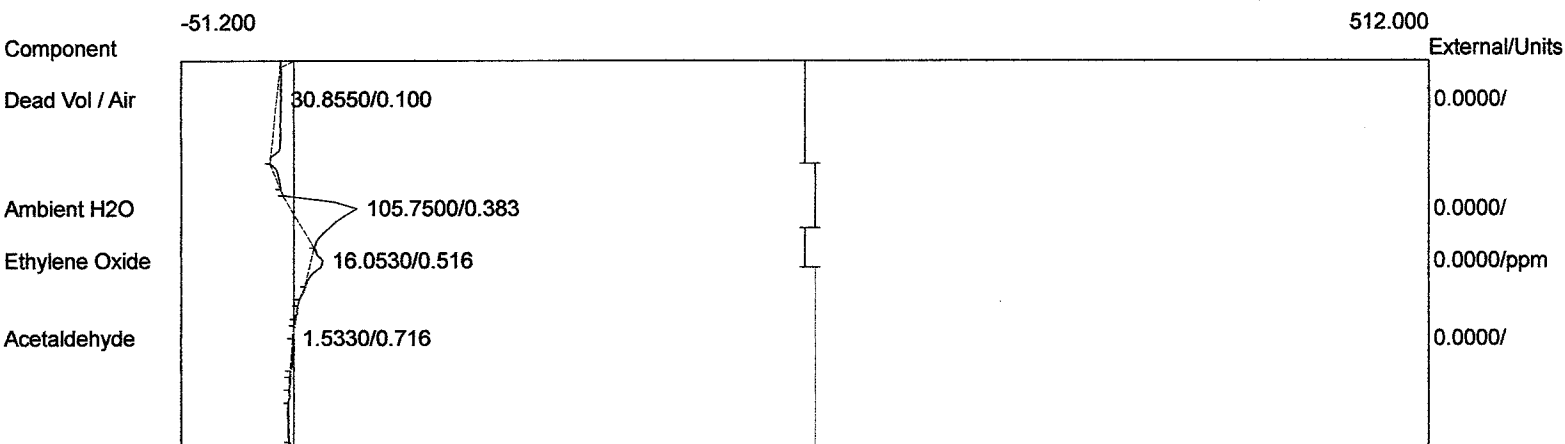
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	35.7475	0.0000	
Ambient H2O	0.366	106.3280	0.0000	
Ethylene Oxide	0.500	16.0870	0.0000	ppm
Acetaldehyde	0.716	1.1450	0.0000	
		159.3075	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 09:11:56
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C15.CHR (c:\peak359)
 Sample: 1.08 ppm EtO std
 Operator: D. Kremer



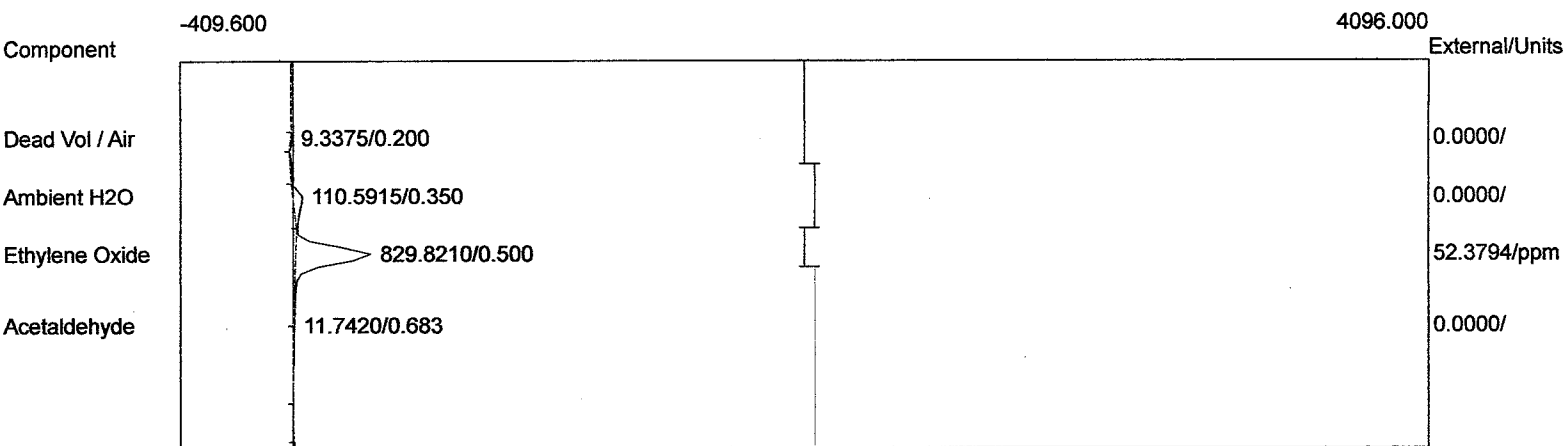
Component	Retention	Area	External	Units
Dead Vol / Air	0.066	43.9180	0.0000	
Ambient H2O	0.366	113.9245	0.0000	
Ethylene Oxide	0.500	15.9945	0.0000	ppm
Acetaldehyde	0.616	1.7225	0.0000	
		175.5595	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 09:13:49
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C16.CHR (c:\peak359)
 Sample: 1.08 ppm EtO std
 Operator: D. Kremer



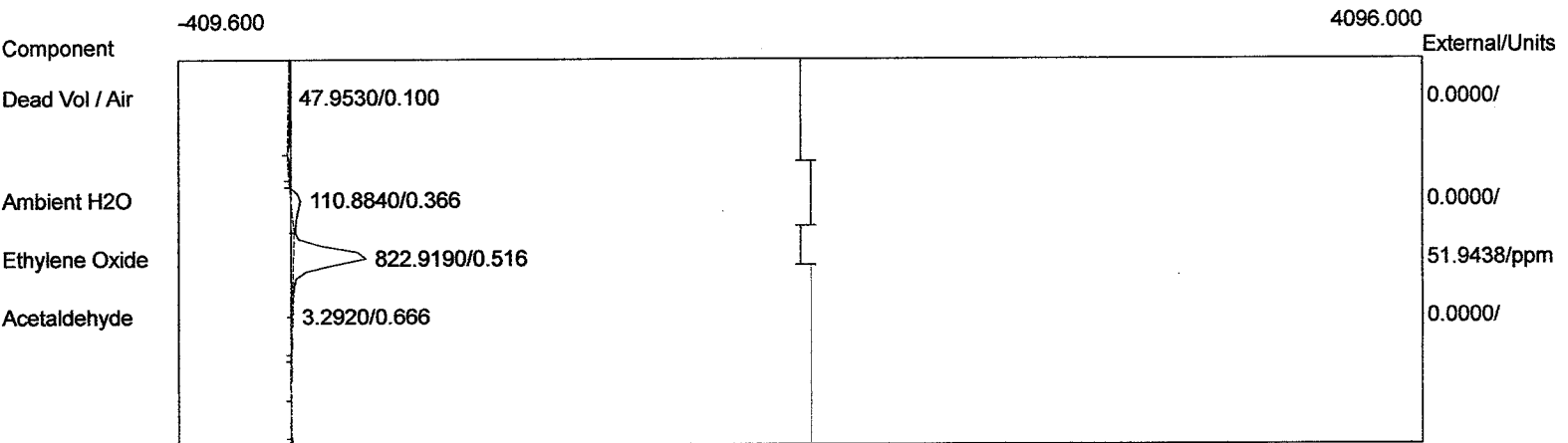
Component	Retention	Area	External	Units
Dead Vol / Air	0.100	30.8550	0.0000	
Ambient H2O	0.383	105.7500	0.0000	
Ethylene Oxide	0.516	16.0530	0.0000	ppm
Acetaldehyde	0.716	1.5330	0.0000	
		154.1910	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 09:18:20
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C17.CHR (c:\peak359)
 Sample: 52.0 ppm EtO std
 Operator: D. Kremer



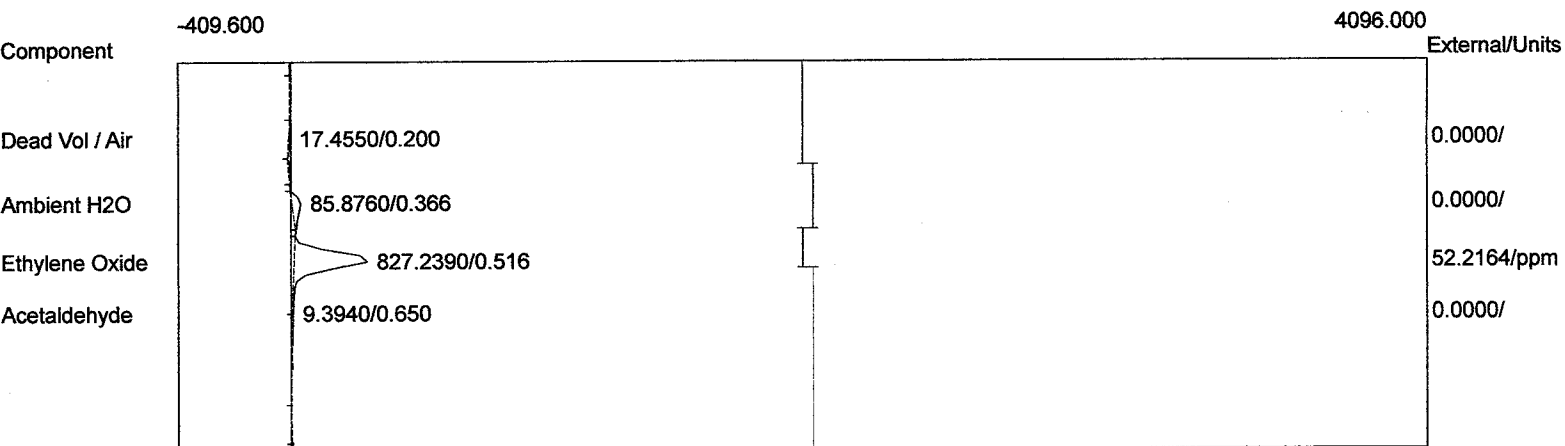
Component	Retention	Area	External	Units
Dead Vol / Air	0.200	9.3375	0.0000	
Ambient H2O	0.350	110.5915	0.0000	
Ethylene Oxide	0.500	829.8210	52.3794	ppm
Acetaldehyde	0.683	11.7420	0.0000	
		961.4920	52.3794	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PreCal
 Analysis date: 09/16/2021 09:22:39
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C18.CHR (c:\peak359)
 Sample: 52.0 ppm EtO std
 Operator: D. Kremer
 Comments: Sample Line Bias Cal



Component	Retention	Area	External	Units
Dead Vol / Air	0.100	47.9530	0.0000	
Ambient H2O	0.366	110.8840	0.0000	
Ethylene Oxide	0.516	822.9190	51.9438	ppm
Acetaldehyde	0.666	3.2920	0.0000	
		985.0480	51.9438	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: PostCal
 Analysis date: 09/16/2021 11:48:34
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Control filename: DEFAULT.CON
 Data file: 2SterQB2021-C19.CHR (c:\peak359)
 Sample: 52.0 ppm EtO std
 Operator: D. Kremer

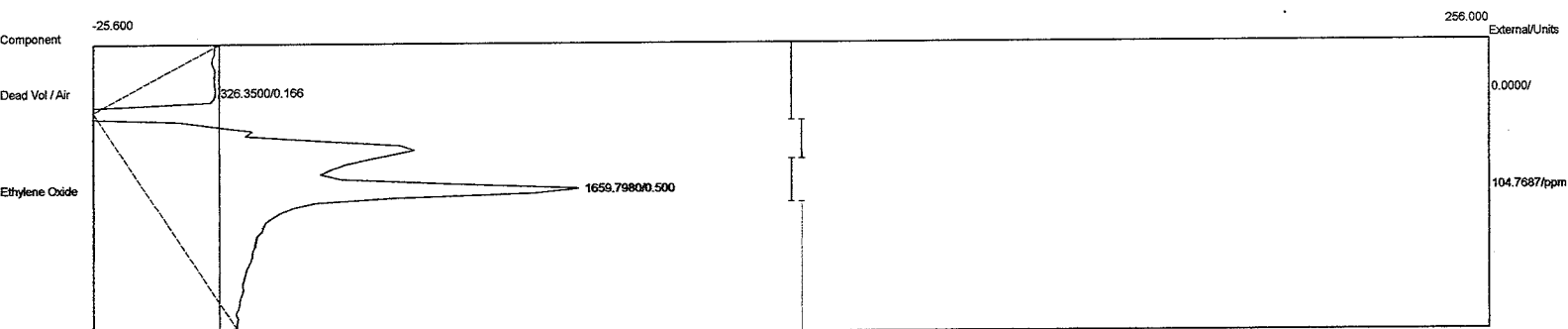


Component	Retention	Area	External	Units
Dead Vol / Air	0.200	17.4550	0.0000	
Ambient H2O	0.366	85.8760	0.0000	
Ethylene Oxide	0.516	827.2390	52.2164	ppm
Acetaldehyde	0.650	9.3940	0.0000	
		939.9640	52.2164	

APPENDIX B

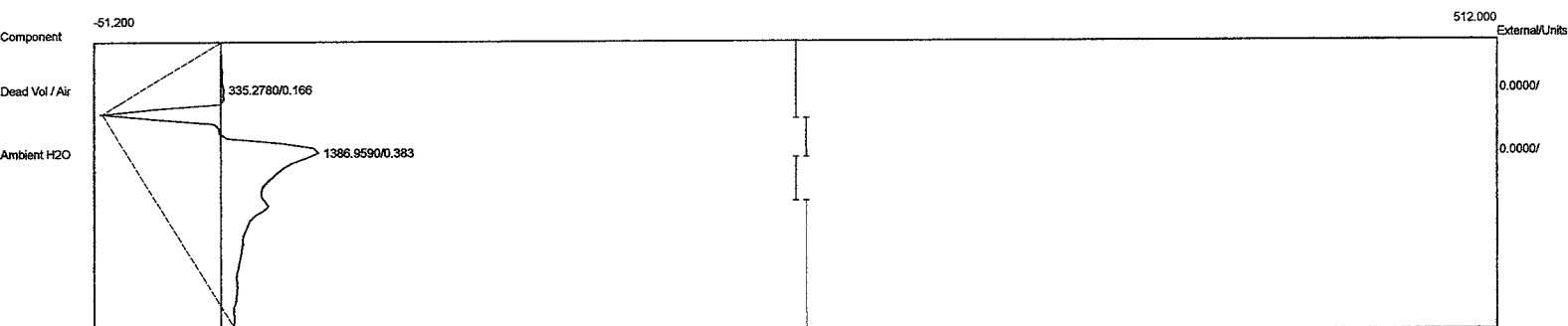
Run #1 Chromatograms

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#3Exh
 Analysis date: 09/16/2021 11:02:01
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-3E01.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



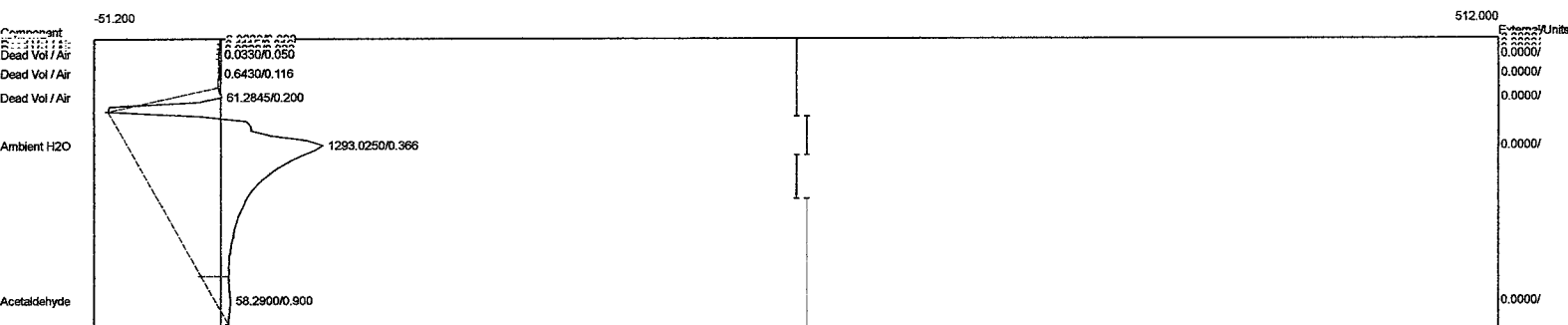
Component	Retention	Area	External Units
Dead Vol / Air	0.166	326.3500	0.0000
Ethylene Oxide	0.500	1659.7980	104.7687 ppm
		1986.1480	104.7687

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#1Exh
 Analysis date: 09/16/2021 10:18:01
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carboxpack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-1E01.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



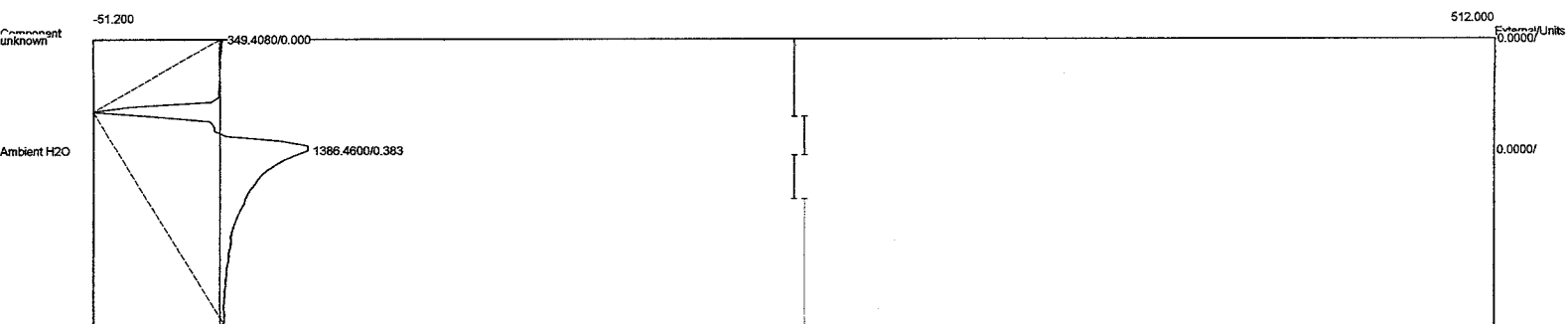
Component	Retention	Area	External	Units
Dead Vol / Air	0.166	335.2780	0.0000	
Ambient H2O	0.383	1386.9590	0.0000	
		1722.2370	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#1Exh
 Analysis date: 09/16/2021 10:19:08
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-1E02.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



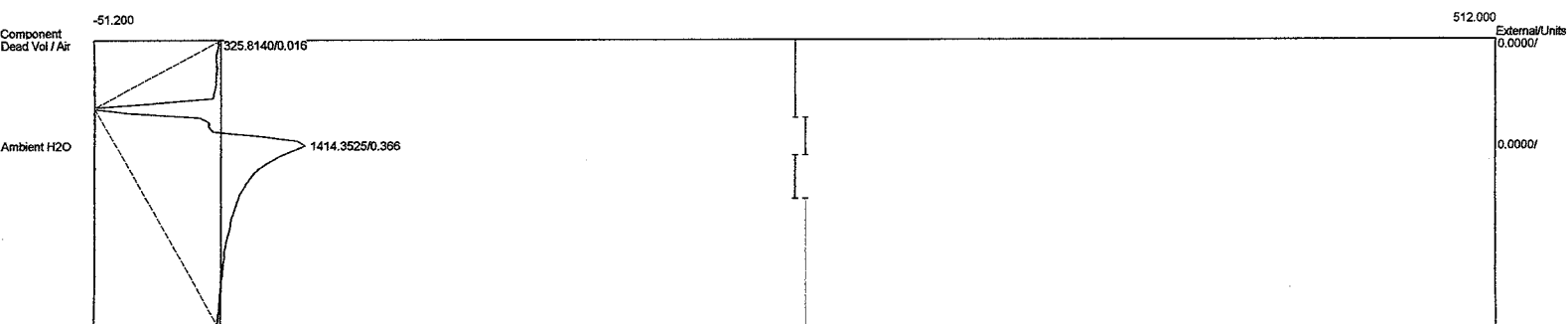
Component	Retention	Area	External Units
Dead Vol / Air	0.016	0.1115	0.0000
Dead Vol / Air	0.033	0.0830	0.0000
Dead Vol / Air	0.050	0.0330	0.0000
Dead Vol / Air	0.116	0.6430	0.0000
Dead Vol / Air	0.200	61.2845	0.0000
Ambient H2O	0.366	1293.0250	0.0000
Acetaldehyde	0.900	58.2900	0.0000
		1413.4700	0.0000

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#1Exh
 Analysis date: 09/16/2021 10:20:14
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-1E03.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



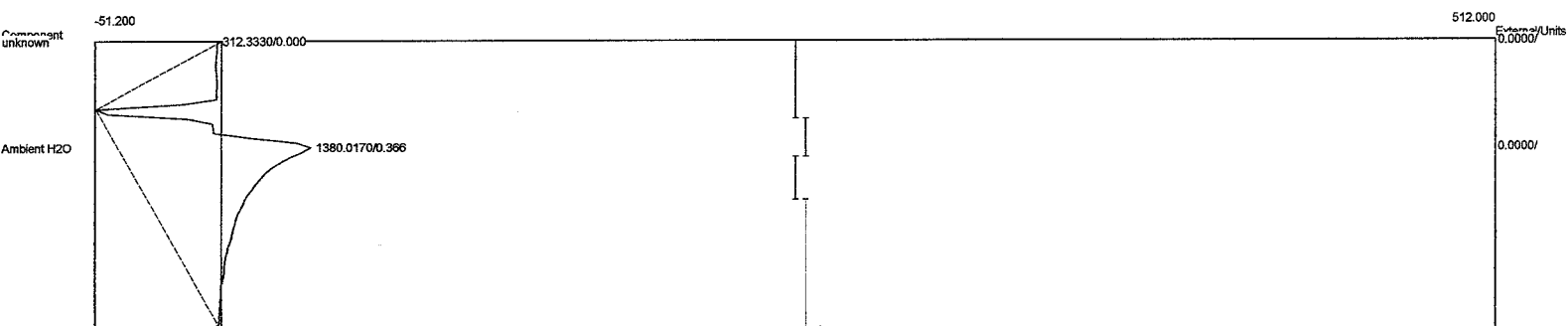
Component	Retention	Area	External	Units
Ambient H2O	0.383	1386.4600	0.0000	
		1386.4600	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#1Exh
 Analysis date: 09/16/2021 10:21:22
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-1E04.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



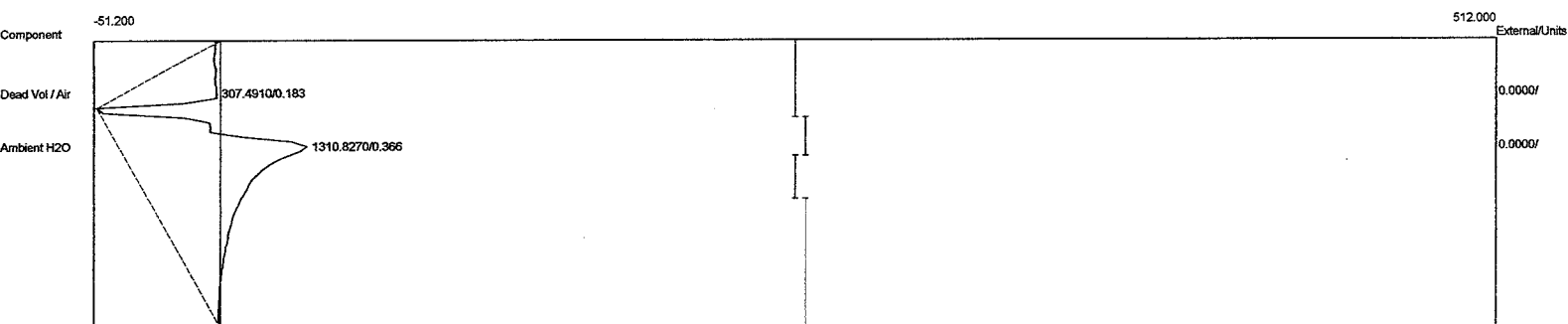
Component	Retention	Area	External Units
Dead Vol / Air	0.016	325.8140	0.0000
Ambient H2O	0.366	1414.3525	0.0000
		1740.1665	0.0000

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#1Exh
 Analysis date: 09/16/2021 10:22:28
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-1E05.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



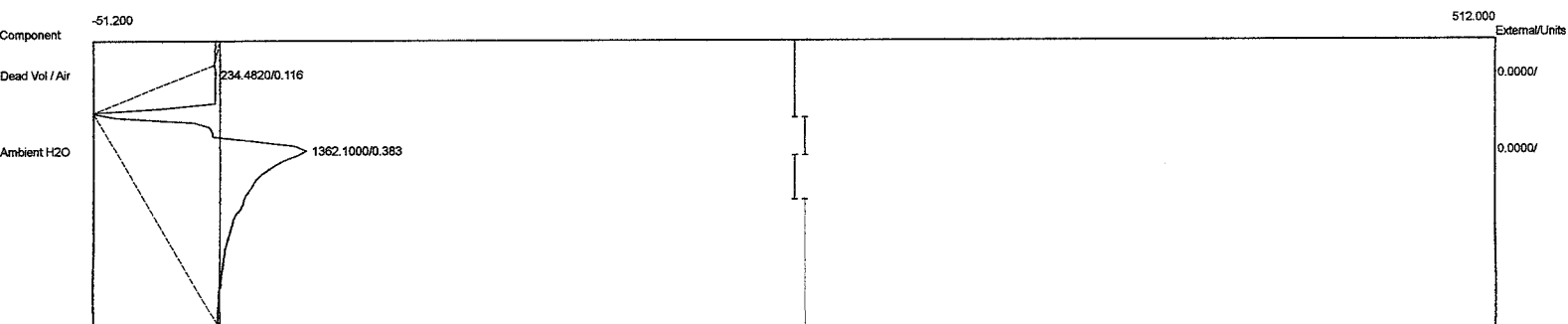
Component	Retention	Area	External Units
Ambient H2O	0.366	1380.0170	0.0000
		1380.0170	0.0000

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#1Exh
 Analysis date: 09/16/2021 10:23:42
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-1E06.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



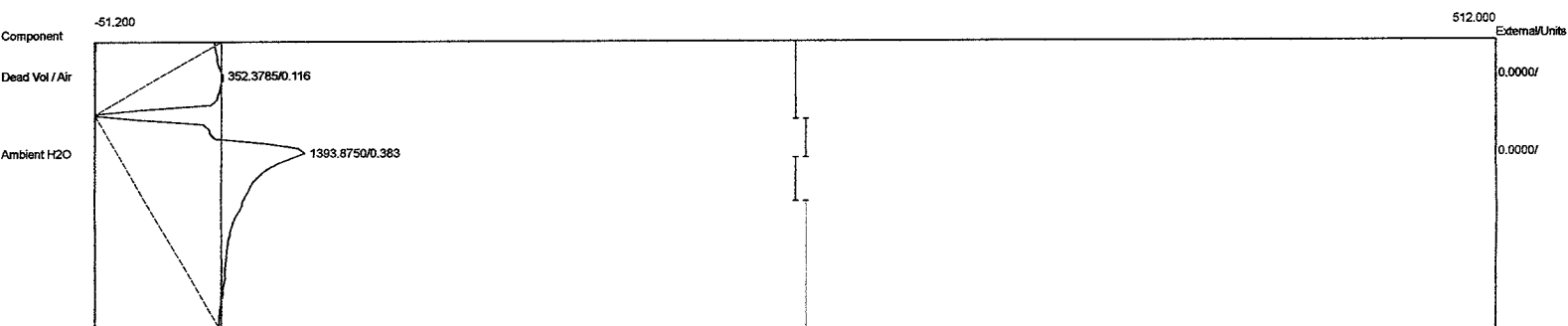
Component	Retention	Area	External	Units
Dead Vol / Air	0.183	307.4910	0.0000	
Ambient H2O	0.366	1310.8270	0.0000	
		1618.3180	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#1Exh
 Analysis date: 09/16/2021 10:24:51
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-1E07.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



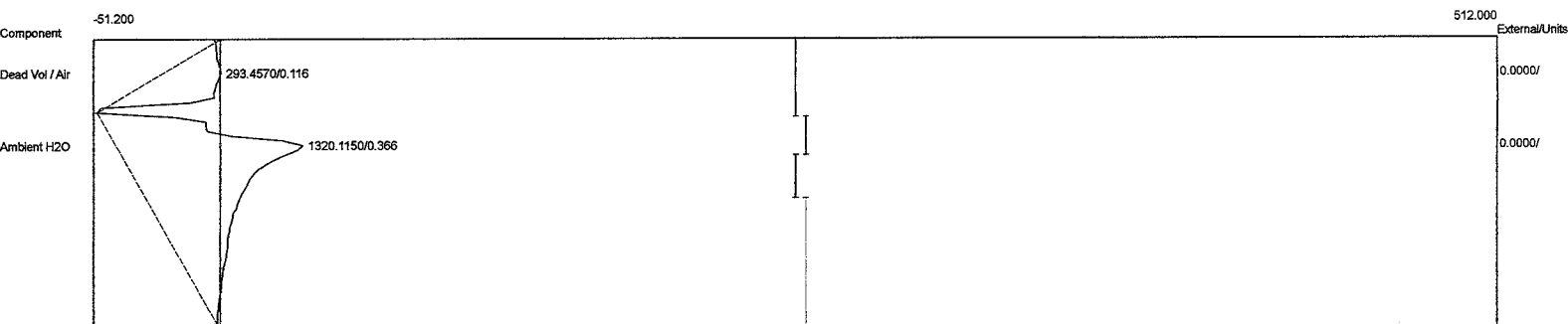
Component	Retention	Area	External	Units
Dead Vol / Air	0.116	234.4820	0.0000	
Ambient H2O	0.383	1362.1000	0.0000	
		1596.5820	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#1Exh
 Analysis date: 09/16/2021 10:26:10
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-1E08.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



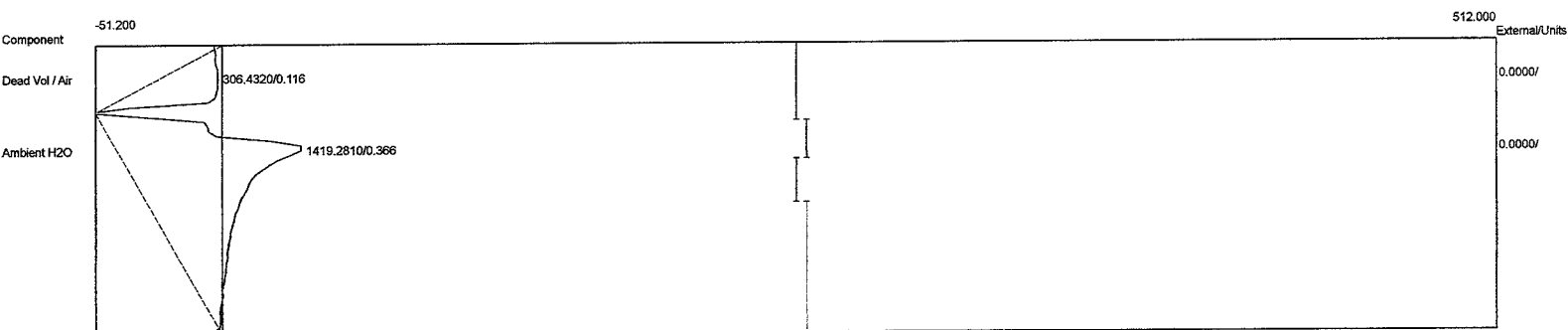
Component	Retention	Area	External	Units
Dead Vol / Air	0.116	352.3785	0.0000	
Ambient H2O	0.383	1393.8750	0.0000	
		1746.2535	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#1Exh
 Analysis date: 09/16/2021 10:27:29
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-1E09.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



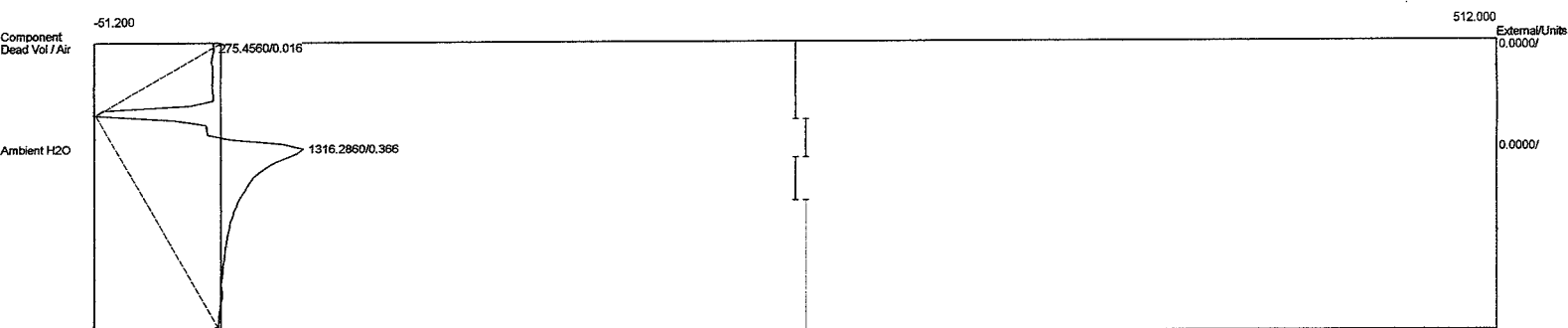
Component	Retention	Area	External	Units
Dead Vol / Air	0.116	293.4570	0.0000	
Ambient H2O	0.366	1320.1150	0.0000	
		1613.5720	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#1Exh
 Analysis date: 09/16/2021 10:28:47
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carboxpack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-1E10.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



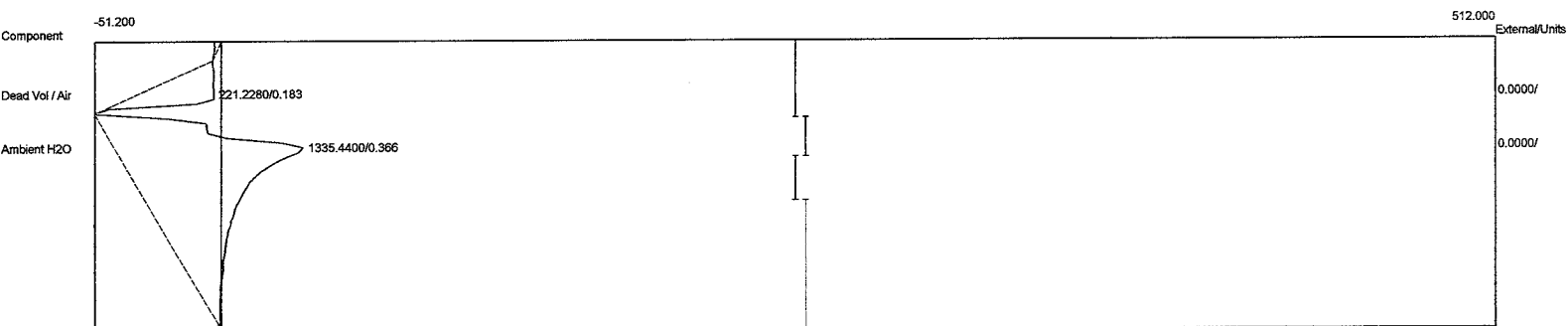
Component	Retention	Area	External	Units
Dead Vol / Air	0.116	306.4320	0.0000	
Ambient H2O	0.366	1419.2810	0.0000	
		1725.7130	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#1Exh
 Analysis date: 09/16/2021 10:29:58
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-1E11.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



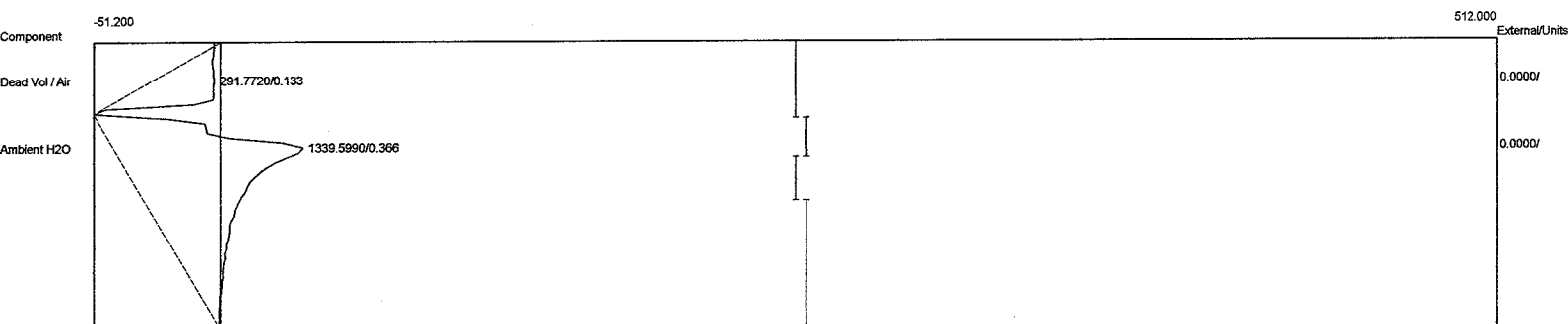
Component	Retention	Area	External	Units
Dead Vol / Air	0.016	275.4560	0.0000	
Ambient H2O	0.366	1316.2860	0.0000	
		1591.7420	0.0000	

Lab name: ECSI
 Client: Sterigenics Queensbury
 Client ID: Run#1Exh
 Analysis date: 09/16/2021 10:31:09
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-1E12.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



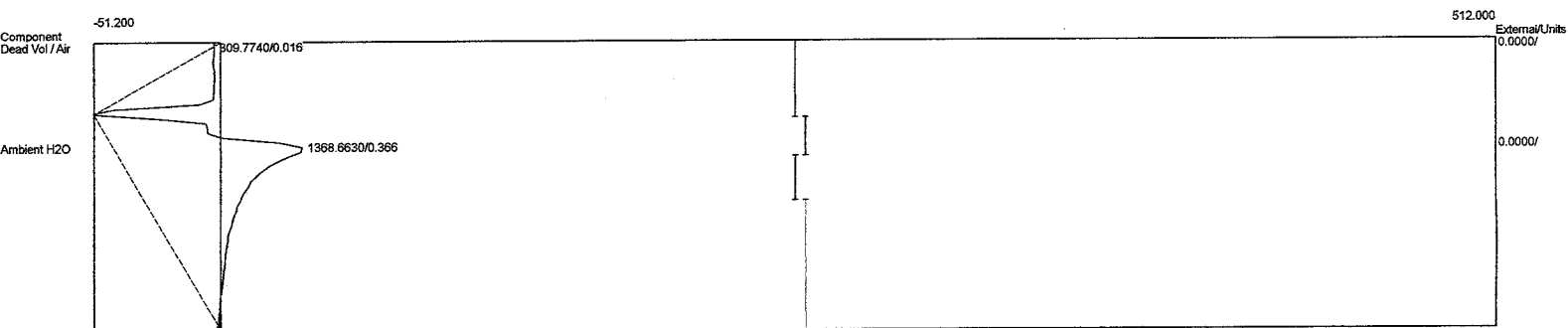
Component	Retention	Area	External Units
Dead Vol / Air	0.183	221.2280	0.0000
Ambient H2O	0.366	1335.4400	0.0000
		1556.6680	0.0000

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#1Exh
 Analysis date: 09/16/2021 10:32:22
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carboxpack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-1E13.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



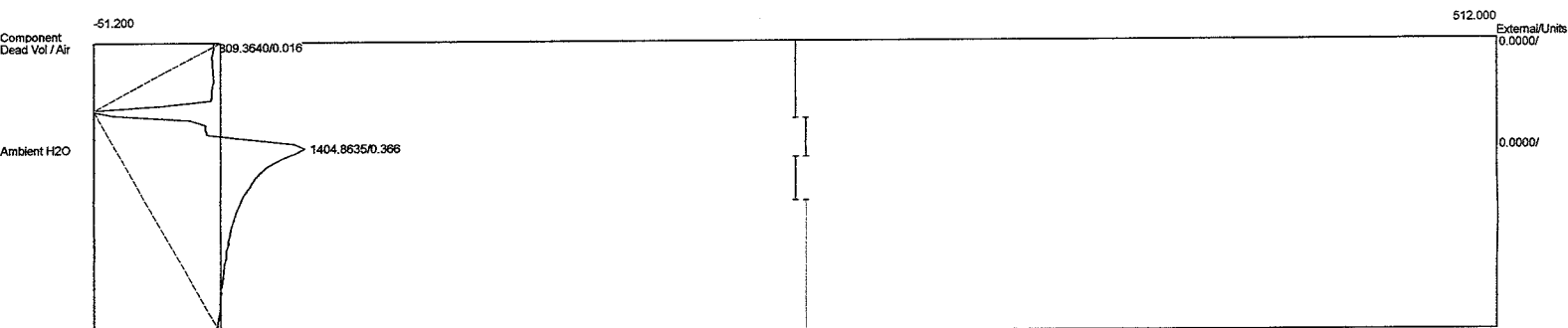
Component	Retention	Area	External	Units
Dead Vol / Air	0.133	291.7720	0.0000	
Ambient H2O	0.366	1339.5990	0.0000	
		1631.3710	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#1Exh
 Analysis date: 09/16/2021 10:33:39
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-1E14.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.016	309.7740	0.0000	
Ambient H2O	0.366	1368.6630	0.0000	
		1678.4370	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#1Exh
 Analysis date: 09/16/2021 10:35:08
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-1E15.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.016	309.3640	0.0000	
Ambient H2O	0.366	1404.8635	0.0000	
		1714.2275	0.0000	

Lab name: ECSi

Client: Sterigenics Queensbury

Client ID: Run#1Exh

Analysis date: 09/16/2021 10:36:25

Method: Direct Injection

Description: CHANNEL 2 - PID

Column: 1% SP-1000, Carbopack B

Carrier: HELIUM

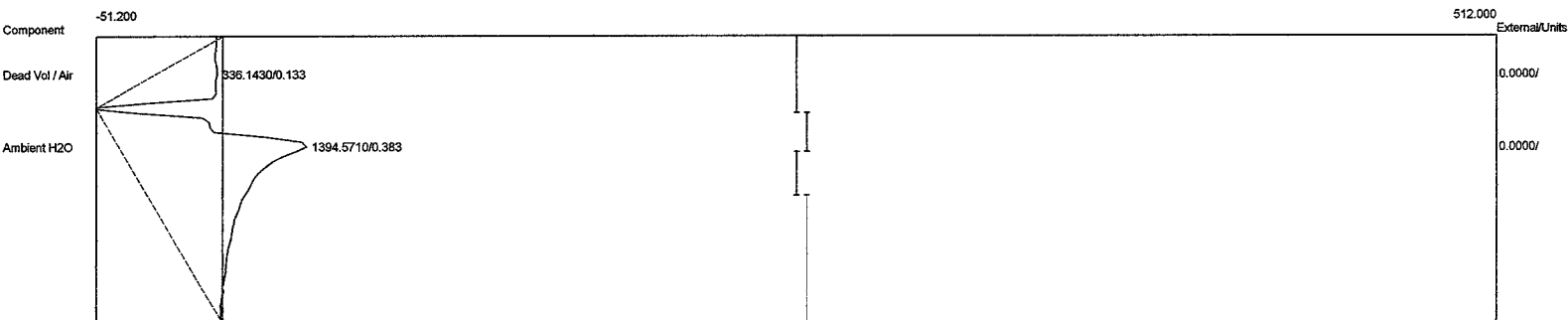
Temp. prog: eto-100.tem

Components: eto2-100.cpt

Data file: 2SterQB2021-1E16.CHR (c:\peak359)

Sample: Ceilcote Scrubber Outlet

Operator: D. Kremer

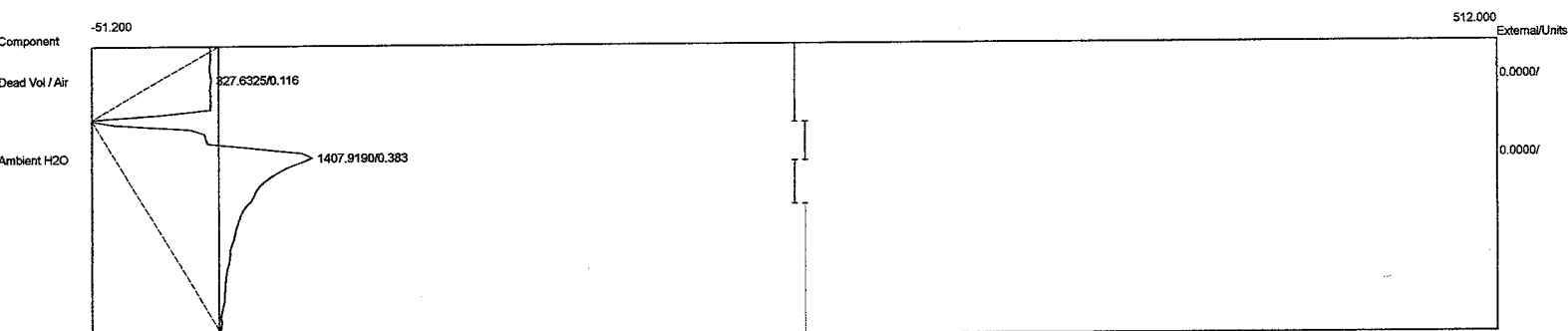


Component	Retention	Area	External	Units
Dead Vol / Air	0.133	336.1430	0.0000	
Ambient H2O	0.383	1394.5710	0.0000	
		1730.7140	0.0000	

APPENDIX C

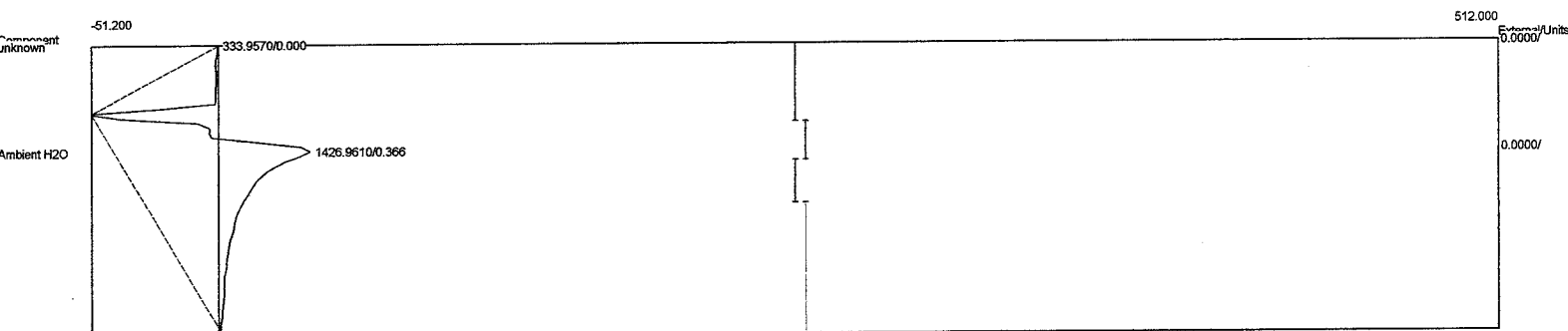
Run #2 Chromatograms

Lab name: ECSI
 Client: Sterigenics Queensbury
 Client ID: Run#2Exh
 Analysis date: 09/16/2021 10:39:20
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-2E01.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



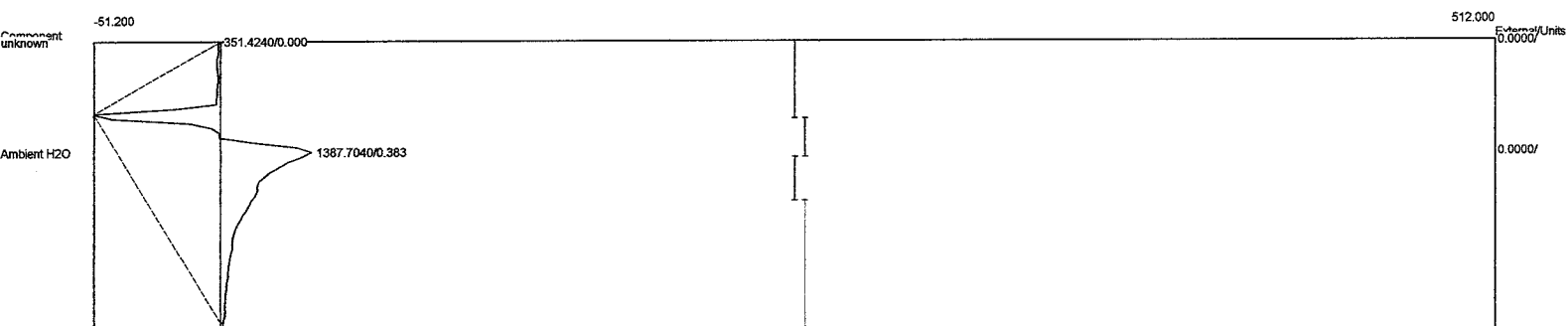
Component	Retention	Area	External	Units
Dead Vol / Air	0.116	327.6325	0.0000	
Ambient H2O	0.383	1407.9190	0.0000	
		1735.5515	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#2Exh
 Analysis date: 09/16/2021 10:40:29
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-2E02.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



Component	Retention	Area	External	Units
Ambient H2O	0.366	1426.9610	0.0000	
		1426.9610	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#2Exh
 Analysis date: 09/16/2021 10:41:46
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-2E03.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



Component	Retention	Area	External	Units
Ambient H2O	0.383	1387.7040	0.0000	
		1387.7040	0.0000	

Client ID: Run#2Exh

Analysis date: 09/16/2021 10:43:07

Method: Direct Injection

Description: CHANNEL 2 - PID

Column: 1% SP-1000, Carbopack B

Carrier: HELIUM

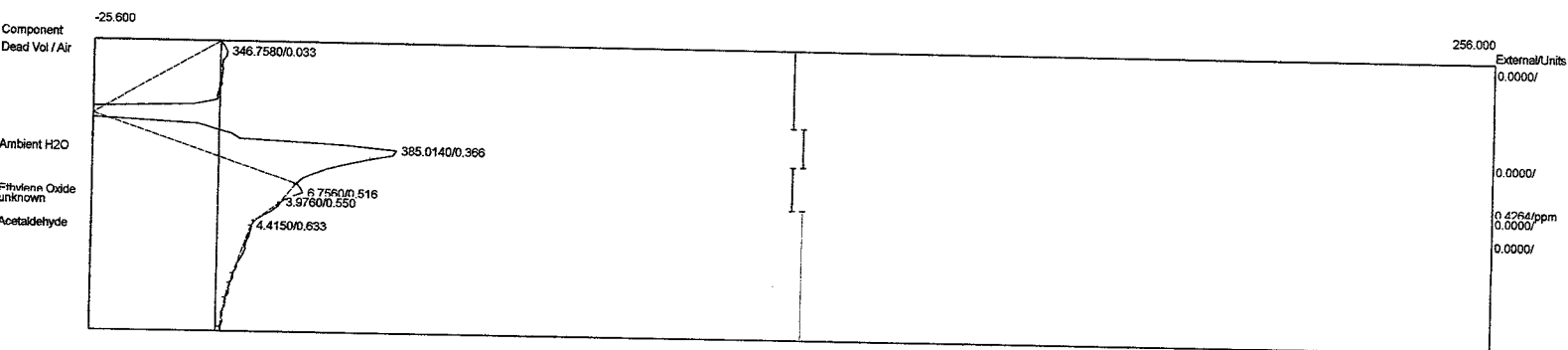
Temp. prog: eto-100.tem

Components: eto2-100.cpt

Data file: 2SterQB2021-2E04.CHR (c:\peak359)

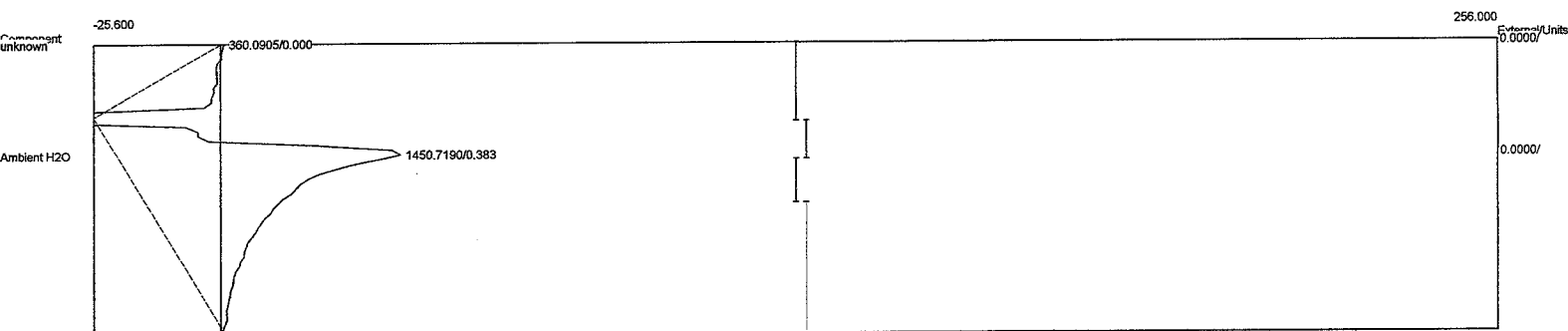
Sample: Ceilcote Scrubber Outlet

Operator: D. Kremer



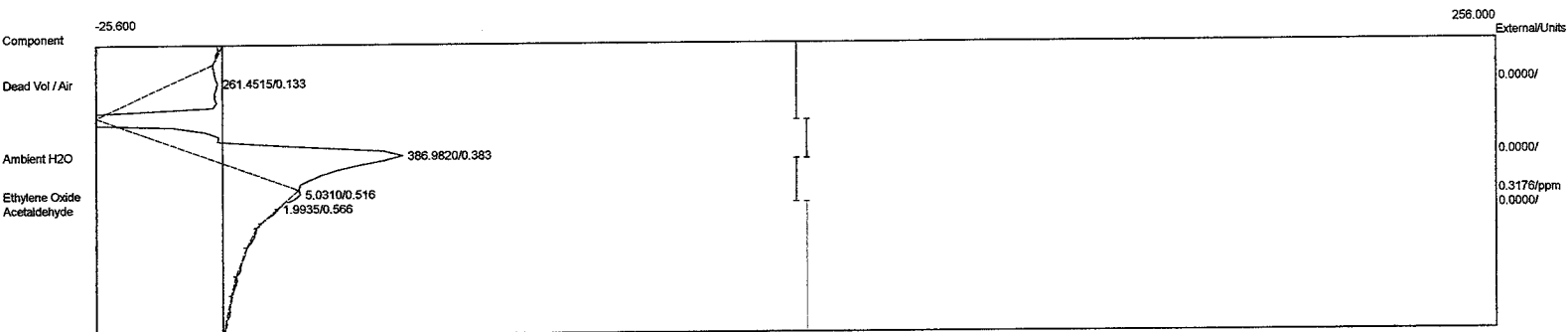
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	346.7580	0.0000	
Ambient H2O	0.366	385.0140	0.0000	
Ethylene Oxide	0.516	6.7560	0.4264	ppm
Acetaldehyde	0.633	4.4150	0.0000	
		742.9430	0.4264	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#2Exh
 Analysis date: 09/16/2021 10:44:38
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-2E05.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



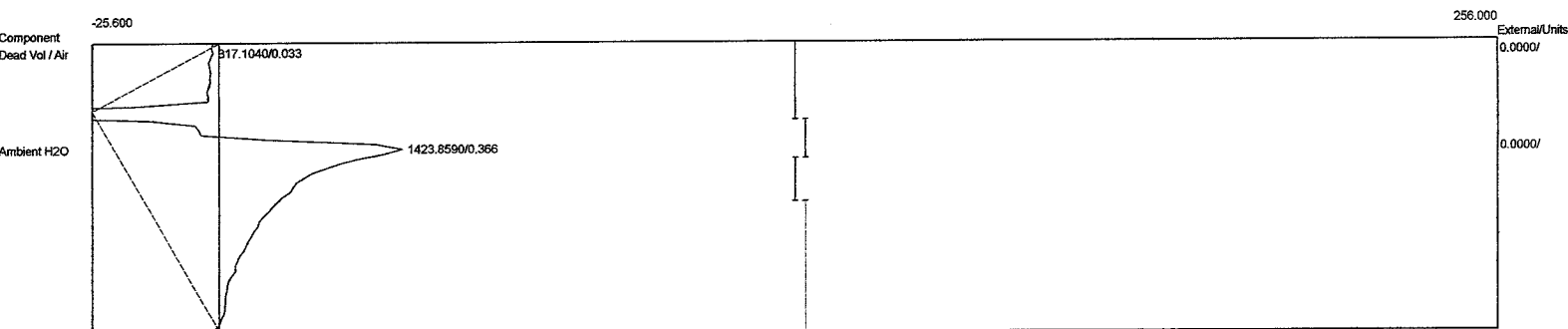
Component	Retention	Area	External	Units
Ambient H2O	0.383	1450.7190	0.0000	
		1450.7190	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#2Exh
 Analysis date: 09/16/2021 10:45:55
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carboxpack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-2E06.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



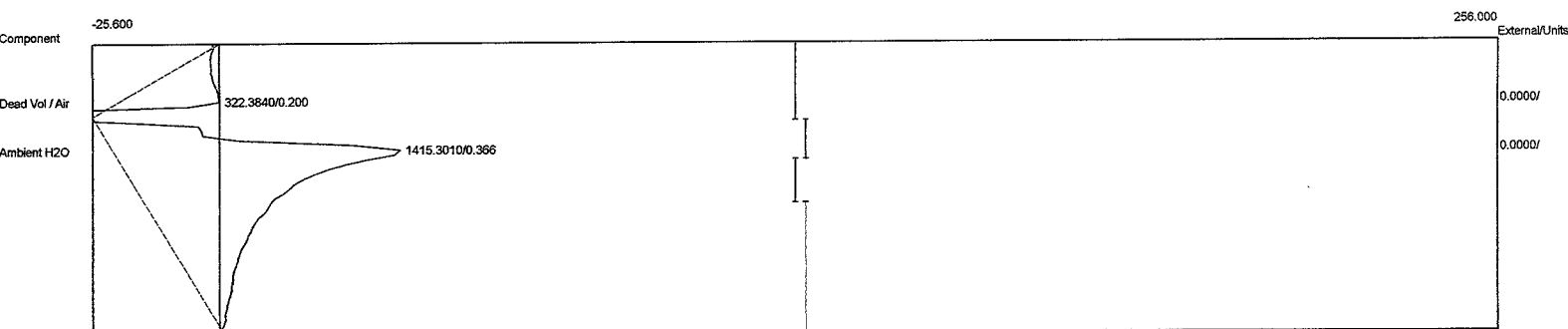
Component	Retention	Area	External	Units
Dead Vol / Air	0.133	261.4515	0.0000	
Ambient H2O	0.383	386.9820	0.0000	
Ethylene Oxide	0.516	5.0310	0.3176	ppm
Acetaldehyde	0.566	1.9935	0.0000	
		655.4580	0.3176	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#2Exh
 Analysis date: 09/16/2021 10:47:27
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-2E07.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



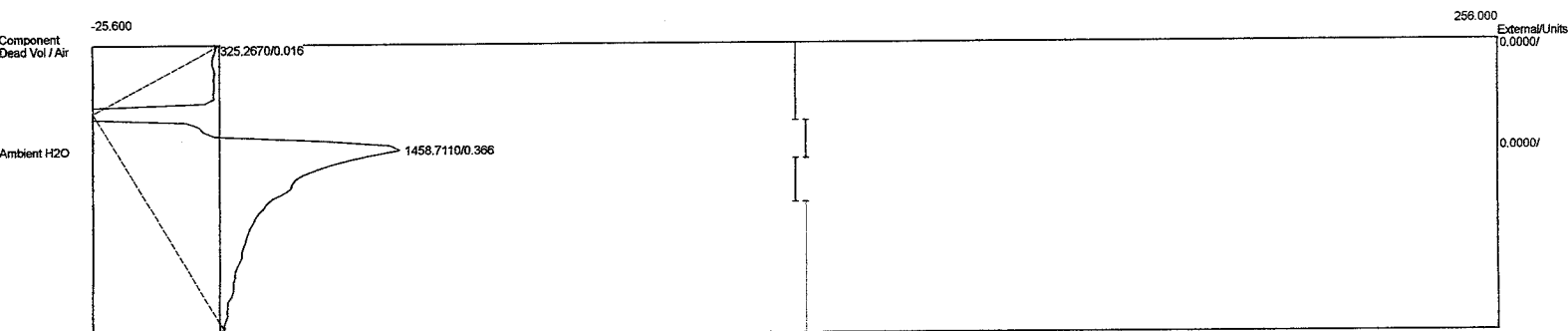
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	317.1040	0.0000	
Ambient H2O	0.366	1423.8590	0.0000	
		1740.9630	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#2Exh
 Analysis date: 09/16/2021 10:48:40
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carboxpack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-2E08.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



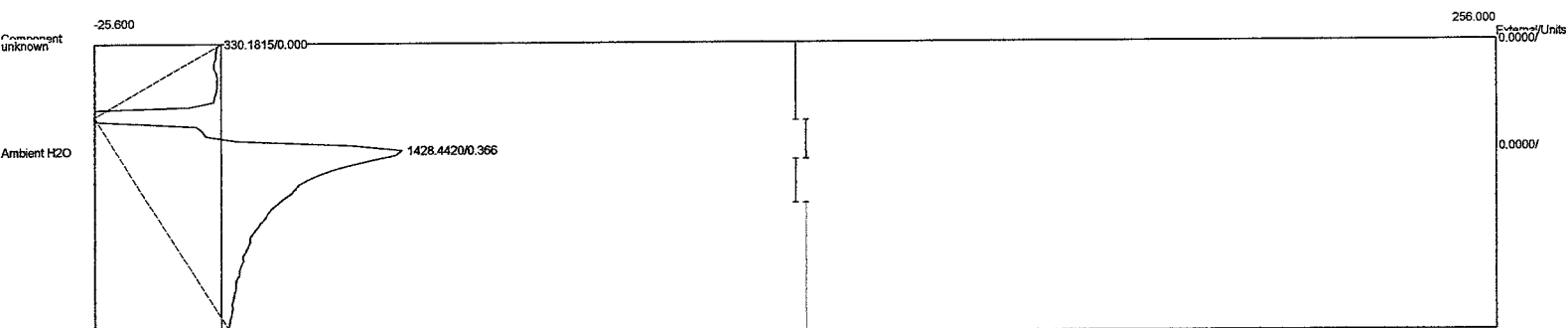
Component	Retention	Area	External	Units
Dead Vol / Air	0.200	322.3840	0.0000	
Ambient H2O	0.366	1415.3010	0.0000	
		1737.6850	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#2Exh
 Analysis date: 09/16/2021 10:50:01
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-2E09.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



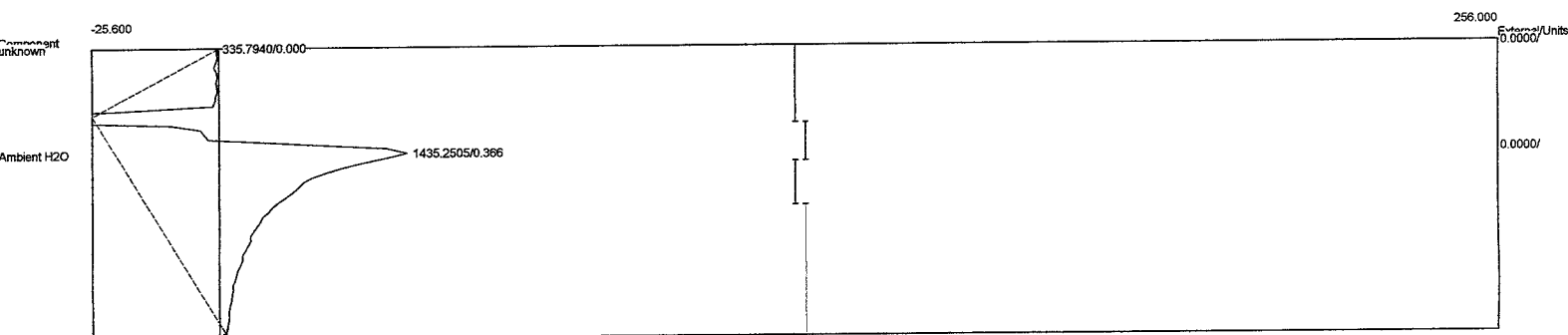
Component	Retention	Area	External Units
Dead Vol / Air	0.016	325.2670	0.0000
Ambient H2O	0.366	1458.7110	0.0000
		1783.9780	0.0000

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#2Exh
 Analysis date: 09/16/2021 10:51:29
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-2E10.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



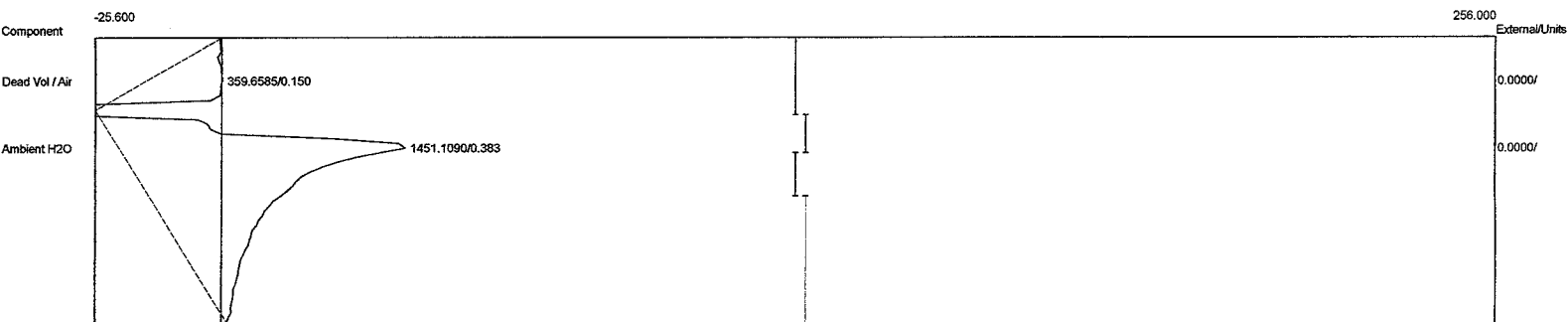
Component	Retention	Area	External	Units
Ambient H2O	0.366	1428.4420	0.0000	
		1428.4420	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#2Exh
 Analysis date: 09/16/2021 10:52:56
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carboxpack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-2E11.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



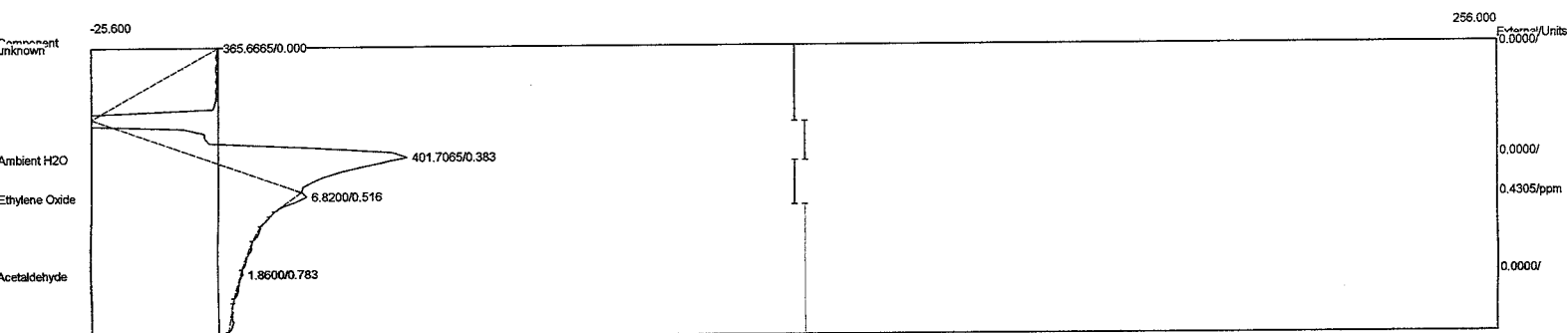
Component	Retention	Area	External	Units
Ambient H2O	0.366	1435.2505	0.0000	
		1435.2505	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#2Exh
 Analysis date: 09/16/2021 10:54:13
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-2E12.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



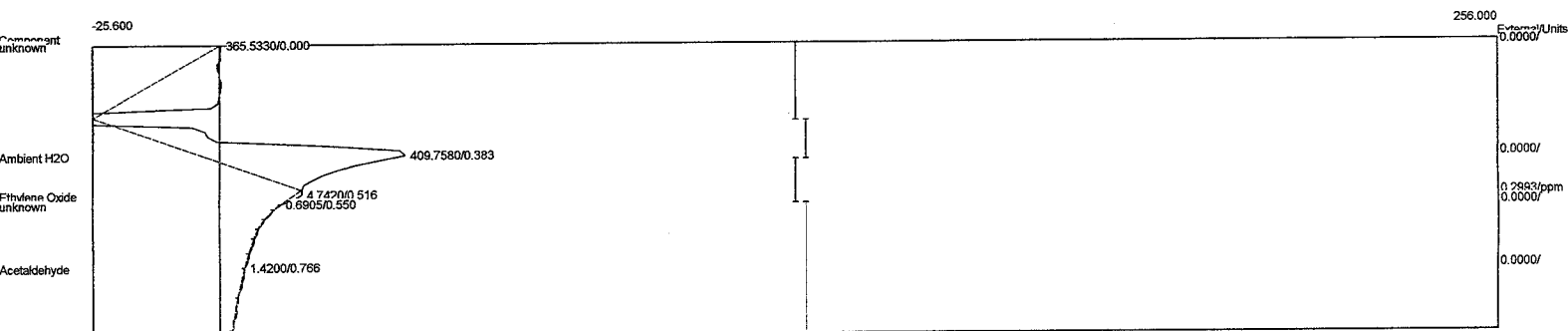
Component	Retention	Area	External	Units
Dead Vol / Air	0.150	359.6585	0.0000	
Ambient H2O	0.383	1451.1090	0.0000	
		1810.7675	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#2Exh
 Analysis date: 09/16/2021 10:55:34
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-2E13.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



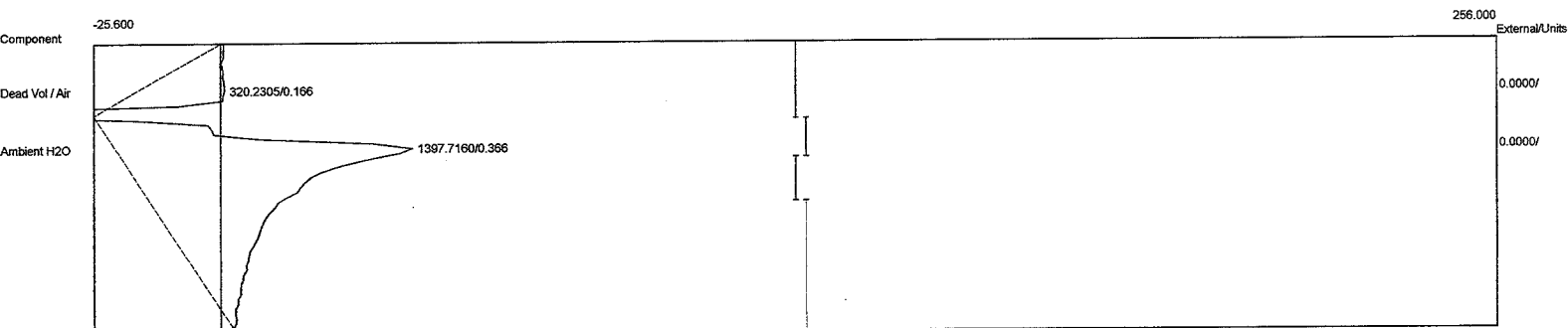
Component	Retention	Area	External Units
Ambient H2O	0.383	401.7065	0.0000
Ethylene Oxide	0.516	6.8200	0.4305 ppm
Acetaldehyde	0.783	1.8600	0.0000
		410.3865	0.4305

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#2Exh
 Analysis date: 09/16/2021 10:56:53
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-2E14.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



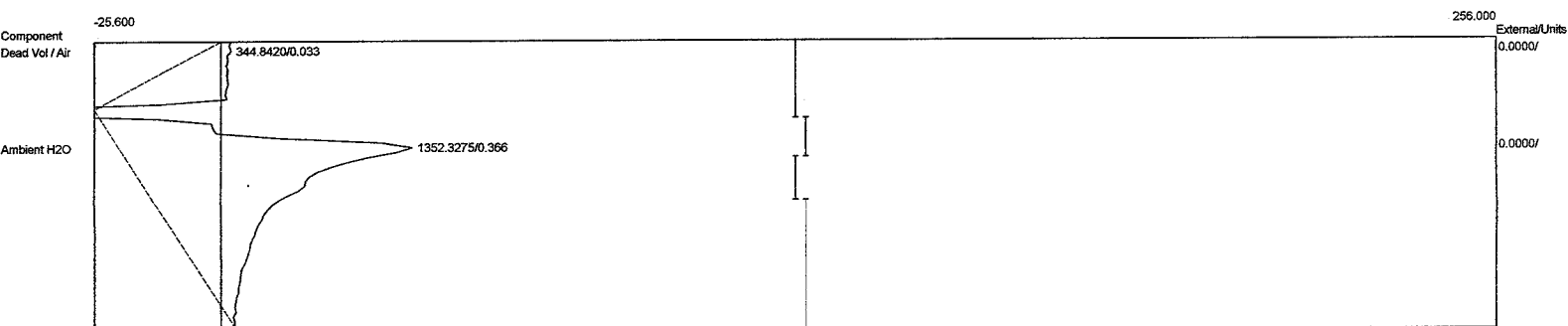
Component	Retention	Area	External Units
Ambient H2O	0.383	409.7580	0.0000
Ethylene Oxide	0.516	4.7420	0.2993 ppm
Acetaldehyde	0.766	1.4200	0.0000
		415.9200	0.2993

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#2Exh
 Analysis date: 09/16/2021 10:58:10
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-2E15.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.166	320.2305	0.0000	
Ambient H2O	0.366	1397.7160	0.0000	
		1717.9465	0.0000	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#2Exh
 Analysis date: 09/16/2021 10:59:13
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carboxpack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-2E16.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer

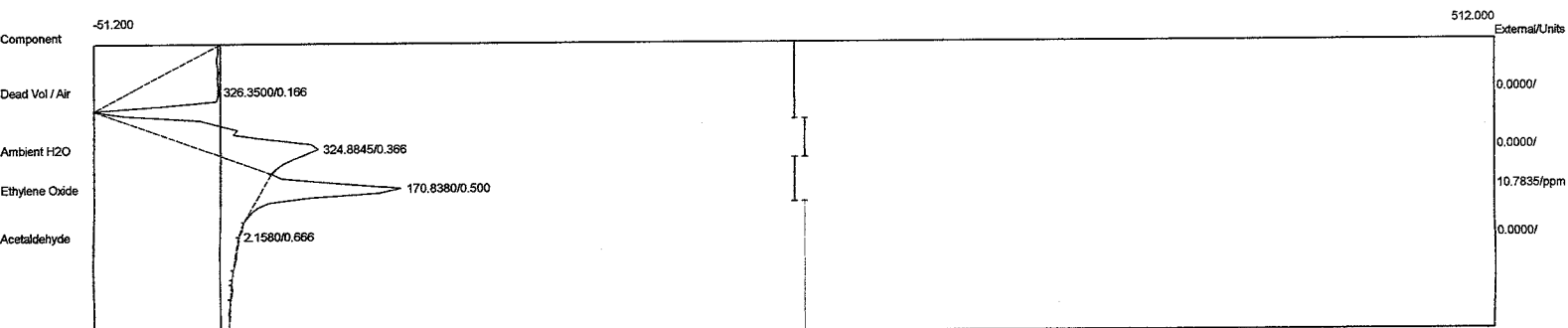


Component	Retention	Area	External	Units
Dead Vol / Air	0.033	344.8420	0.0000	
Ambient H2O	0.366	1352.3275	0.0000	
		1697.1695	0.0000	

APPENDIX D

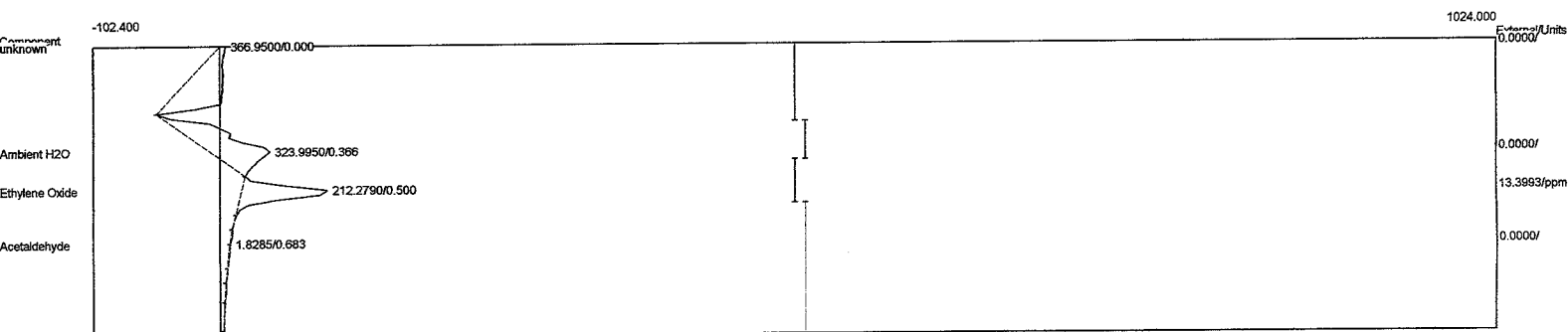
Run #3 Chromatograms

Lab name: ECSI
 Client: Sterigenics Queensbury
 Client ID: Run#3Exh
 Analysis date: 09/16/2021 11:02:01
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carboxpack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-3E01.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



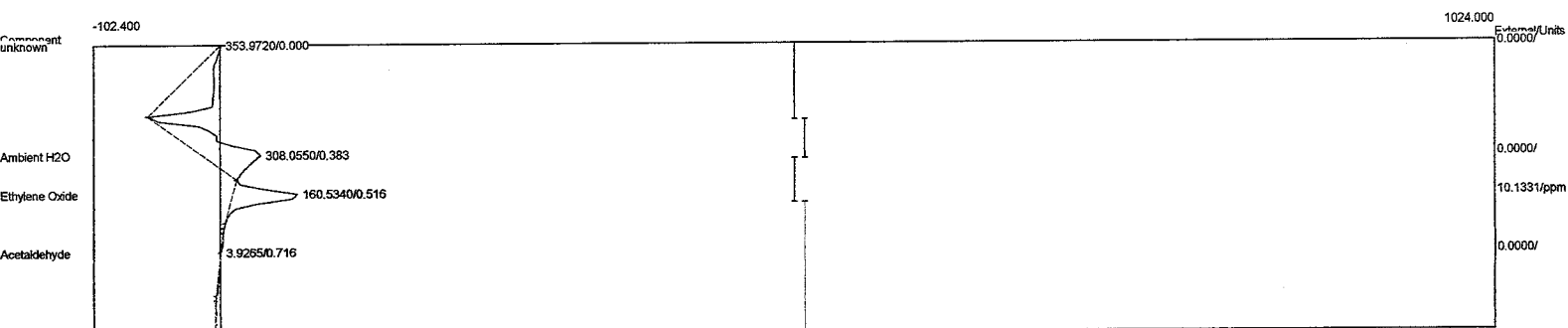
Component	Retention	Area	External Units
Dead Vol / Air	0.166	326.3500	0.0000
Ambient H2O	0.366	324.8845	0.0000
Ethylene Oxide	0.500	170.8380	10.7835 ppm
Acetaldehyde	0.666	2.1580	0.0000
		824.2305	10.7835

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#3Exh
 Analysis date: 09/16/2021 11:03:28
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-3E02.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



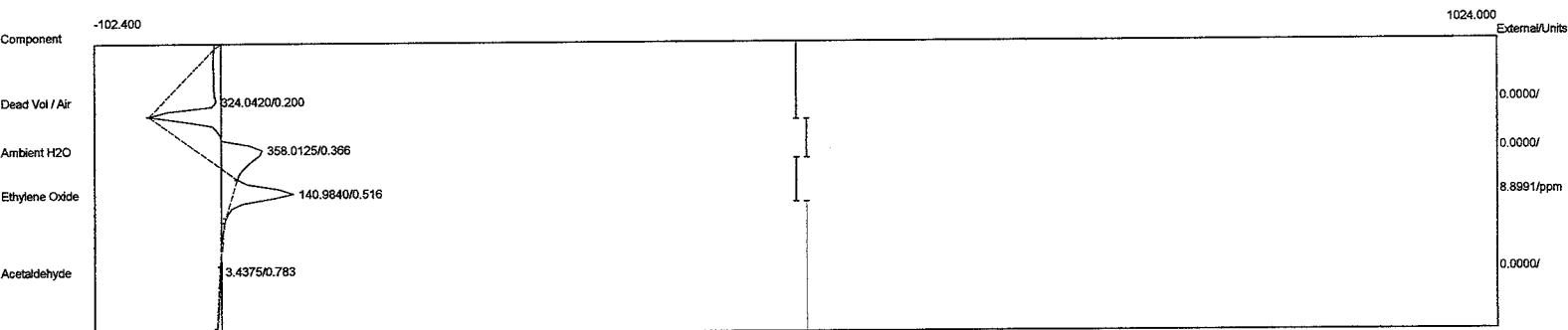
Component	Retention	Area	External Units
Ambient H2O	0.366	323.9950	0.0000
Ethylene Oxide	0.500	212.2790	13.3993 ppm
Acetaldehyde	0.683	1.8285	0.0000
		538.1025	13.3993

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#3Exh
 Analysis date: 09/16/2021 11:04:54
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-3E03.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



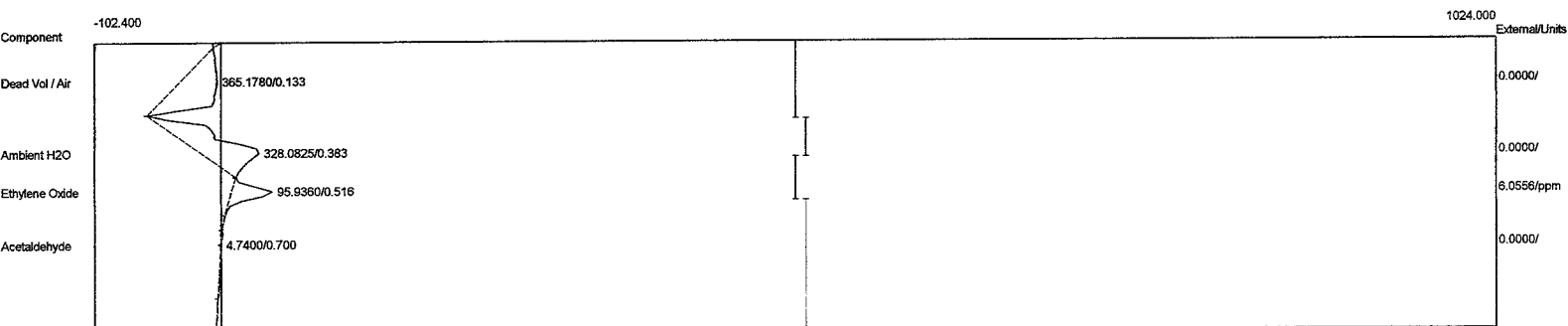
Component	Retention	Area	External Units
Ambient H2O	0.383	308.0550	0.0000
Ethylene Oxide	0.516	160.5340	10.1331 ppm
Acetaldehyde	0.716	3.9265	0.0000
		472.5155	10.1331

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#3Exh
 Analysis date: 09/16/2021 11:06:05
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-3E04.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



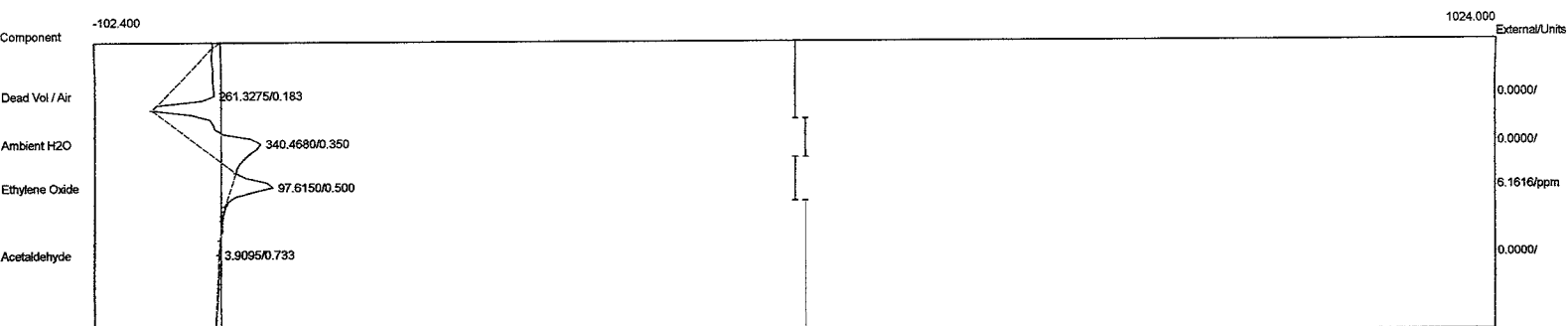
Component	Retention	Area	External	Units
Dead Vol / Air	0.200	324.0420	0.0000	
Ambient H2O	0.366	358.0125	0.0000	
Ethylene Oxide	0.516	140.9840	8.8991	ppm
Acetaldehyde	0.783	3.4375	0.0000	
		826.4760	8.8991	

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#3Exh
 Analysis date: 09/16/2021 11:07:24
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-3E05.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



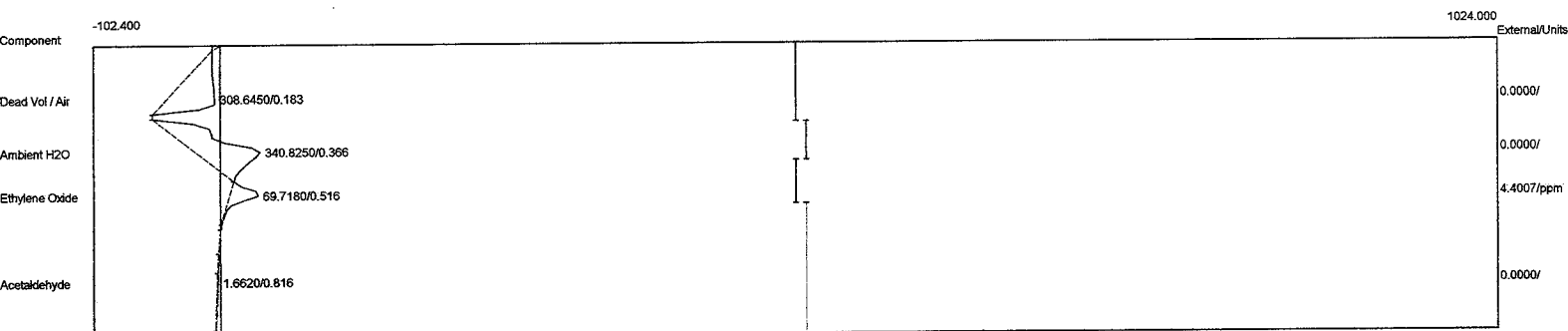
Component	Retention	Area	External Units
Dead Vol / Air	0.133	365.1780	0.0000
Ambient H2O	0.383	328.0825	0.0000
Ethylene Oxide	0.516	95.9360	6.0556 ppm
Acetaldehyde	0.700	4.7400	0.0000
		793.9365	6.0556

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#3Exh
 Analysis date: 09/16/2021 11:08:36
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-3E06.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



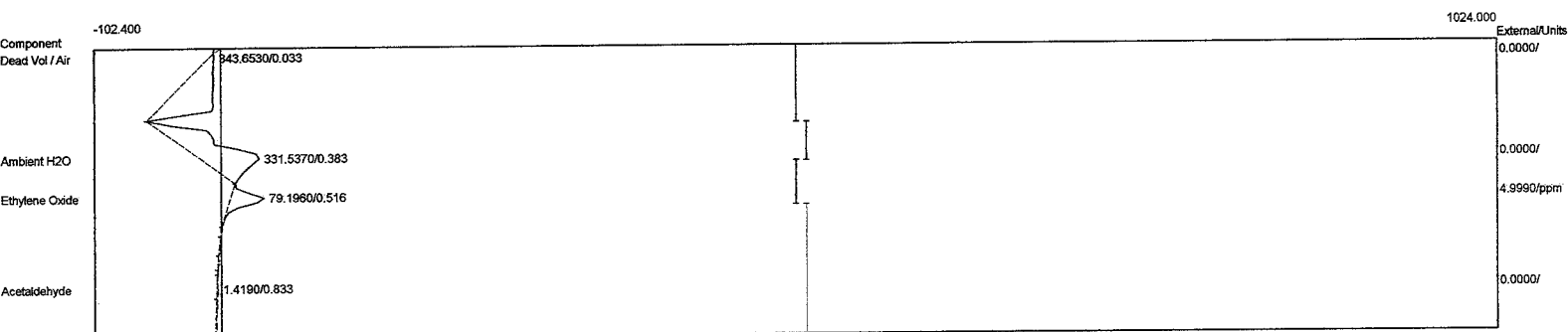
Component	Retention	Area	External Units
Dead Vol / Air	0.183	261.3275	0.0000
Ambient H2O	0.350	340.4680	0.0000
Ethylene Oxide	0.500	97.6150	6.1616 ppm
Acetaldehyde	0.733	3.9095	0.0000
		703.3200	6.1616

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#3Exh
 Analysis date: 09/16/2021 11:09:49
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-3E07.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



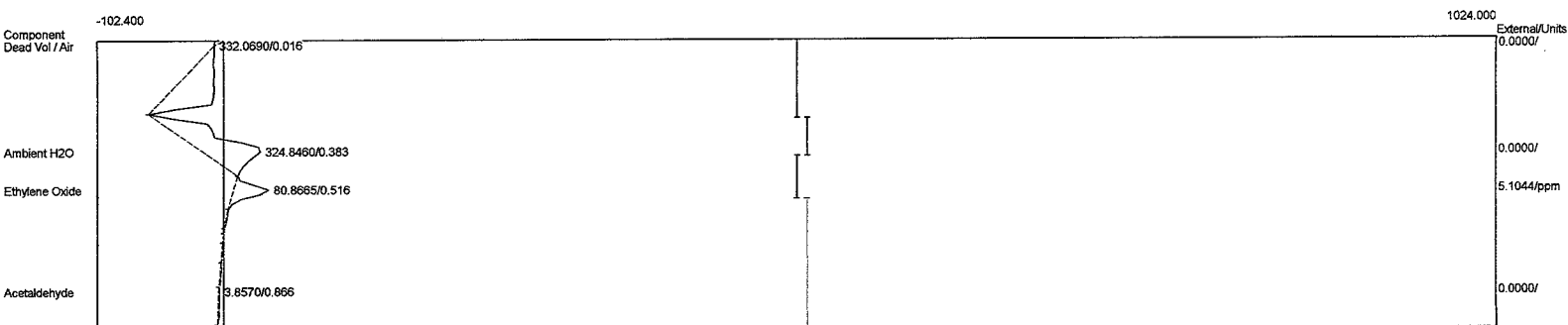
Component	Retention	Area	External Units
Dead Vol / Air	0.183	308.6450	0.0000
Ambient H2O	0.366	340.8250	0.0000
Ethylene Oxide	0.516	69.7180	4.4007 ppm
Acetaldehyde	0.816	1.6620	0.0000
		720.8500	4.4007

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#3Exh
 Analysis date: 09/16/2021 11:10:59
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-3E08.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



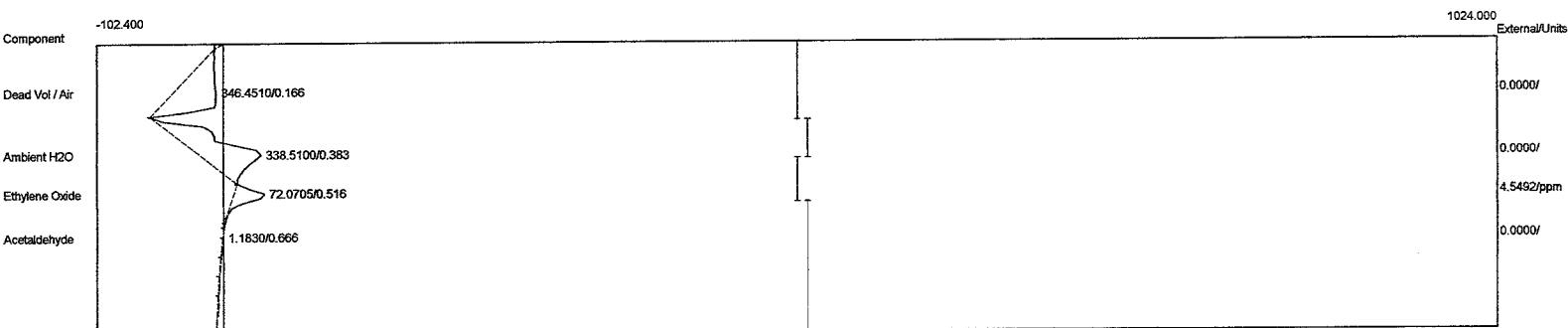
Component	Retention	Area	External	Units
Dead Vol / Air	0.033	343.6530	0.0000	
Ambient H2O	0.383	331.5370	0.0000	
Ethylene Oxide	0.516	79.1960	4.9990	ppm
Acetaldehyde	0.833	1.4190	0.0000	
		755.8050	4.9990	

Lab name: ECSI
 Client: Sterigenics Queensbury
 Client ID: Run#3Exh
 Analysis date: 09/16/2021 11:12:30
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-3E09.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



Component	Retention	Area	External Units
Dead Vol / Air	0.016	332.0690	0.0000
Ambient H2O	0.383	324.8460	0.0000
Ethylene Oxide	0.516	80.8665	5.1044 ppm
Acetaldehyde	0.866	3.8570	0.0000
		741.6385	5.1044

Lab name: ECSi
 Client: Sterigenics Queensbury
 Client ID: Run#3Exh
 Analysis date: 09/16/2021 11:13:45
 Method: Direct Injection
 Description: CHANNEL 2 - PID
 Column: 1% SP-1000, Carbopack B
 Carrier: HELIUM
 Temp. prog: eto-100.tem
 Components: eto2-100.cpt
 Data file: 2SterQB2021-3E10.CHR (c:\peak359)
 Sample: Ceilcote Scrubber Outlet
 Operator: D. Kremer



Component	Retention	Area	External	Units
Dead Vol / Air	0.166	346.4510	0.0000	
Ambient H2O	0.383	338.5100	0.0000	
Ethylene Oxide	0.516	72.0705	4.5492	ppm
Acetaldehyde	0.666	1.1830	0.0000	
		758.2145	4.5492	

Lab name: ECSi

Client: Sterigenics Queensbury

Client ID: Run#3Exh

Analysis date: 09/16/2021 11:16:26

Method: Direct Injection

Description: CHANNEL 2 - PID

Column: 1% SP-1000, Carbopack B

Carrier: HELIUM

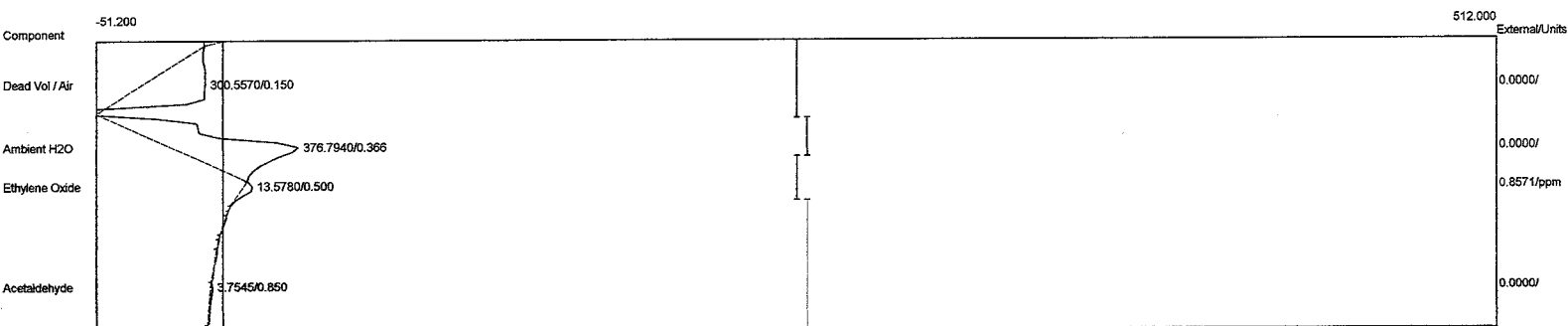
Temp. prog: eto-100.tem

Components: eto2-100.cpt

Data file: 2SterQB2021-3E12.CHR (c:\peak359)

Sample: Ceilcote Scrubber Outlet

Operator: D. Kremer



Component	Retention	Area	External Units
Dead Vol / Air	0.150	300.5570	0.0000
Ambient H2O	0.366	376.7940	0.0000
Ethylene Oxide	0.500	13.5780	0.8571 ppm
Acetaldehyde	0.850	3.7545	0.0000
		694.6835	0.8571

APPENDIX E

Field Data & Calculation Worksheets, Test Port Locations

ECSi, Inc.

Ethylene Oxide Mass Emissions Data and Calculations

Run #1 - Chamber 1 (Ceilcote Scrubber Outlet)

Sterigenics, Inc. - Queensbury, NY

September 16, 2021

<u>DeltaP</u>	<u>SgRtDeltaP</u>	<u>Temp (F)</u>	<u>ppm EtO*</u>	1-%H2O =	0.97	
				mw =	28.54	
				stack ID =	10	in.
0.18	0.4243	122	0.008	stack area =	0.545	sq. in.
0.18	0.4243	122	0.008	press =	29.85	
0.18	0.4243	122	0.008	Tstd =	528	
0.19	0.4359	122	0.008	Pstd =	29.92	
0.19	0.4359	122	0.008	Cp =	0.99	
0.19	0.4359	122	0.008	Kp =	85.49	
0.18	0.4243	122	0.008			
0.18	0.4243	122	0.008	Velocity =	29.8	ft/sec
0.18	0.4243	122	0.008	Flow =	857.1	dscfm
0.18	0.4243	122	0.008			
0.18	0.4243	122	0.008	MWeto =	44.05	
0.18	0.4243	122	0.008	MolVol =	385.32	
0.18	0.4243	122	0.008	ppmv/ft3 =	1000000	
0.18	0.4243	122	0.008			
0.18	0.4243	122	0.008	EtO Mass Flow =	0.0000008	lbs/min
0.18	0.4243	122	0.008			
Average =				evac start =	1017	
0.1819	0.4265	122.0	0.008	evac stop =	1037	
				min/cycle =	20	
				EtO Emissions =	0.0000157	lbs/cycle

* 0.008 ppm is the Method Detection Limit established for this test, value indicates non-detected result

INLET CALCULATION:

Pre-Evac:	V =	1155	ft3	Post-Evac:	V =	1155	ft3
	P =	17.1	in Hg Abs		P =	2.0	in Hg Abs
	T =	118	degF		T =	118	degF
	R =	10.73			R =	10.73	
	mw =	44.05			mw =	44.05	
lbs EtO @ 100% =	68.76	lbs		lbs EtO @ 100% =	8.04	lbs	

Initial EtO = Scale Wt. =	57.3	lbs
% EtO @ Chamber = Scale Wt. / lbs EtO @ 100% (Pre) =	83.3	%
Final EtO = % EtO @ Chamber X lbs EtO @ 100% (Post) =	6.7	lbs
INLET ETO = Initial EtO - Final EtO =	50.6	lbs

CONTROL EFFICIENCY = 99.99997 %

ECSi, Inc.

Ethylene Oxide Mass Emissions Data and Calculations

Run #2 - Chamber 2 (Ceilcote Scrubber Outlet)

Sterigenics, Inc. - Queensbury, NY

September 16, 2021

<u>DeltaP</u>	<u>SgRtDeltaP</u>	<u>Temp (F)</u>	<u>ppm EtO*</u>	1-%H2O =	0.97	
				mw =	28.54	
				stack ID =	10	in.
0.18	0.4243	123	0.008	stack area =	0.545	sq. in.
0.18	0.4243	123	0.008	press =	29.85	
0.18	0.4243	123	0.008	Tstd =	528	
0.18	0.4243	123	0.426	Pstd =	29.92	
0.18	0.4243	123	0.008	Cp =	0.99	
0.19	0.4359	123	0.318	Kp =	85.49	
0.19	0.4359	123	0.008			
0.19	0.4359	123	0.008	Velocity =	30.0	ft/sec
0.19	0.4359	123	0.008	Flow =	859.0	dscfm
0.18	0.4243	124	0.008			
0.18	0.4243	124	0.008	MWeto =	44.05	
0.19	0.4359	124	0.008	MolVol =	385.32	
0.18	0.4243	124	0.431	ppmv/ft3 =	1000000	
0.18	0.4243	124	0.299			
0.18	0.4243	124	0.008	EtO Mass Flow =	0.0000096	lbs/min
0.18	0.4243	124	0.008			
				evac start =	1038	
Average =				evac stop =	1059	
0.1831	0.4279	123.4	0.098	min/cycle =	21	
				EtO Emissions =	0.0002024	lbs/cycle

* 0.008 ppm is the Method Detection Limit established for this test, value indicates non-detected result

INLET CALCULATION:

Pre-Evac:	V =	1155	ft3	Post-Evac:	V =	1155	ft3
	P =	17.0	in Hg Abs		P =	2.0	in Hg Abs
	T =	119	degF		T =	117	degF
	R =	10.73			R =	10.73	
	mw =	44.05			mw =	44.05	
lbs EtO @ 100% =		68.24	lbs	lbs EtO @ 100% =		8.06	lbs

Initial EtO = Scale Wt. =	54.7	lbs
% EtO @ Chamber = Scale Wt. / lbs EtO @ 100% (Pre) =	80.2	%
Final EtO = % EtO @ Chamber X lbs EtO @ 100% (Post) =	6.5	lbs
INLET ETO = Initial EtO - Final EtO =	48.2	lbs

CONTROL EFFICIENCY = 99.99958 %

ECSi, Inc.

Ethylene Oxide Mass Emissions Data and Calculations

Run #3 - Chamber E (Ceilcote Scrubber Outlet)

Sterigenics, Inc. - Queensbury, NY

September 16, 2021

<u>DeltaP</u>	<u>SgRtDeltaP</u>	<u>Temp (F)</u>	<u>ppm EtO</u>	1-%H2O =	0.97	
				mw =	28.54	
				stack ID =	10	in.
0.18	0.4243	124	10.8	stack area =	0.545	sq. in.
0.18	0.4243	124	13.4	press =	29.85	
0.19	0.4359	124	10.1	Tstd =	528	
0.18	0.4243	124	8.90	Pstd =	29.92	
0.18	0.4243	124	6.06	Cp =	0.99	
0.18	0.4243	124	6.16	Kp =	85.49	
0.18	0.4243	124	4.40			
0.18	0.4243	124	5.00	Velocity =	29.9	ft/sec
0.19	0.4359	124	5.10	Flow =	855.2	dscfm
0.18	0.4243	124	4.55			
0.18	0.4243	124	2.98	MWeto =	44.05	
0.18	0.4243	124	0.857	MolVol =	385.32	
				ppmv/ft3 =	1000000	
Average =						
0.1817	0.4262	124.0	6.53	EtO Mass Flow =	0.0006380	lbs/min
	=	584	degR	evac start =	1101	
				evac stop =	1117	
				min/cycle =	16	
				EtO Emissions =	0.0102074	lbs/cycle

* 0.008 ppm is the Method Detection Limit established for this test, value indicates non-detected result

INLET CALCULATION:

Pre-Evac:	V =	1333	ft3	Post-Evac:	V =	1333	ft3
	P =	16.9	in Hg Abs		P =	2.0	in Hg Abs
	T =	119	degF		T =	118	degF
	R =	10.73			R =	10.73	
	mw =	44.05			mw =	44.05	
lbs EtO @ 100% =		78.30	lbs	lbs EtO @ 100% =		9.28	lbs
				Initial EtO = Scale Wt. =	64.2	lbs	
	% EtO @ Chamber = Scale Wt. / lbs EtO @ 100% (Pre) =	82.0	%				
	Final EtO = % EtO @ Chamber X lbs EtO @ 100% (Post) =	7.6	lbs				
	INLET ETO = Initial EtO - Final EtO =	56.6	lbs				

CONTROL EFFICIENCY = 99.98196 %

ECSi - VELOCITY TRAVERSE DATA

Client: Sterigenics, Inc. Run #: 1 Date: 9/16/2021 Port Sketch: _____

Location: Queensbury, NY Probe Type: Std. Baro Press: 29.45

Source: Ceilcote Packed Tower Scrubber Outlet Stack I.D.: 10 in. Static Press: -0.01

Port 1								Port 2						
Inches From Port	Point#	Delta P				Stack Temp (F)	Cyclonic Angle	Point#	Delta P				Stack Temp (F)	Cyclonic Angle
		Low	High	Average	Sq Root				Low	High	Average	Sq Root		
0.33	1	0.17	0.17	0.17	0.4123	128	0	1	0.17	0.17	0.17	0.4123	128	0
1.0	2	0.17	0.18	0.175	0.4183	129	0	2	0.18	0.18	0.18	0.4243	128	0
1.9	3	0.18	0.18	0.18	0.4243	129	0	3	0.18	0.19	0.185	0.4301	129	0
3.3	4	0.18	0.19	0.185	0.4301	129	0	4	0.19	0.19	0.19	0.4359	129	0
6.8	5	0.19	0.19	0.19	0.4359	129	0	5	0.19	0.19	0.19	0.4359	129	0
8.1	6	0.19	0.19	0.19	0.4359	129	0	6	0.19	0.19	0.19	0.4359	129	0
9.00	7	0.18	0.19	0.185	0.4301	129	0	7	0.18	0.19	0.185	0.4301	129	0
9.7	8	0.17	0.18	0.175	0.4183	129	0	8	0.18	0.18	0.18	0.4243	129	0
	9							9						
	10							10						
	11							11						
	12							12						
	13							13						
	14							14						
	15							15						
	16							16						
	17							17						
	18							18						
	19							19						
	20							20						
	21							21						
	22							22						
	23							23						
	24							24						
Average Values:											0.1825	0.4271	128.8	0.0

APPENDIX F
Gas Certifications



Customer & Order Information:

PRAXAIR PKG SANTA ANA CA HPS
1545 E EDINGER AVE,
SANTA ANA, CA 92705-4907

Praxair Order Number: **71418069**
Customer PO Number: **79410708**

Certificate Issuance Date: **8/5/2020**

Certification Date: **8/5/2020**
Lot Number: **70340 0217 6D**
Part Number: **NI EO1MP-A3**
DocNumber: **237283**
Expiration Date: **8/5/2022**

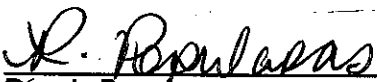
CERTIFICATE OF ANALYSIS
Primary Standard

Component	Requested Concentration (Molar)	Certified Concentration (Molar)	Analytical Reference	Analytical Uncertainty
Ethylene oxide	1 ppm	1.08 ppm	1	± 5 %
Nitrogen	Balance	Balance		

Cylinder Style: **A3**
Cylinder Pressure @ 70 F: **2000 psig**
Cylinder Volume: **27.5 ft³**
Valve Outlet Connection: **CGA 350**
Cylinder Number(s): **FF63980**

Fill Date: **8/4/2020**
Analysis Date: **8/5/2020**

Filling Method: **Gravimetric**


Analyst: **Rönnie Popularas**


QA Reviewer: **Kristen Hanna**

Key to Analytical Techniques:

Reference	Analytical Instrument - Analytical Principle
1	Hewlett-Packard 6890 - Gas Chromatography with FID

The gas calibration cylinder standard prepared by Praxair Distribution, Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Praxair Distribution, Inc. Reference Materials which are traceable to the International System of Units (SI) through either weights traceable to the National Institute of Standards and Technology (NIST) or Measurement Canada, or through NIST Standard Reference Materials or equivalent where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted. Analytical uncertainty is expressed as a Relative % unless otherwise noted.

IMPORTANT

The information contained herein has been prepared at your request by personnel within Praxair Distribution, Inc.. While we believe the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.



Customer & Order Information:

PRAXAIR PKG SANTA ANA CA HPS
1545 E EDINGER AVE,
SANTA ANA, CA 92705-4907

Praxair Order Number: **71423449**
Customer PO Number: **79416198**

Certificate Issuance Date: **8/20/2020**

Certification Date: **8/20/2020**
Lot Number: **70340 0231 1E**
Part Number: **NI EO10MP-A3**
DocNumber: **240056**
Expiration Date: **8/19/2022**

CERTIFICATE OF ANALYSIS
Primary Standard

Component	Requested Concentration (Molar)	Certified Concentration (Molar)	Analytical Reference	Analytical Uncertainty
Ethylene oxide	10 ppm	10.6 ppm	1	± 1 %
Nitrogen	Balance	Balance		

Cylinder Style: **A3**
Cylinder Pressure @ 70 F: **2000 psig**
Cylinder Volume: **28 ft³**
Valve Outlet Connection: **CGA 350**
Cylinder Number(s): **EA0011733**

Fill Date: **8/18/2020**
Analysis Date: **8/19/2020**

Filling Method: **Gravimetric**

Analyst: **Ronnie Popularas**

QA Reviewer: **Jim Maurin**

Key to Analytical Techniques:

Reference	Analytical Instrument - Analytical Principle
1	Hewlett-Packard 6890 - Gas Chromatography with FID

The gas calibration cylinder standard prepared by Praxair Distribution, Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Praxair Distribution, Inc. Reference Materials which are traceable to the International System of Units (SI) through either weights traceable to the National Institute of Standards and Technology (NIST) or Measurement Canada, or through NIST Standard Reference Materials or equivalent where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted. Analytical uncertainty is expressed as a Relative % unless otherwise noted.

IMPORTANT

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Customer & Order Information:

PRAXAIR PKG SANTA ANA CA HPS
1545 E EDINGER AVE,
SANTA ANA, CA 92705

Praxair Order Number: 70953858
Customer PO Number: Verbal

Certificate Issuance Date: 4/20/2021

Certification Date: 4/20/2021
Lot Number: 70340 9119 1F
Part Number: NI EO100P-A3
DocNumber: 326205
Expiration Date: 4/20/2023

CERTIFICATE OF ANALYSIS
Primary Standard

Component	Requested Concentration (Molar)	Certified Concentration (Molar)	Analytical Reference	Analytical Uncertainty
Ethylene oxide		100 ppm	1	± 1 %
Nitrogen		Balance		

Cylinder Style: A3
Cylinder Pressure @ 70 F: 1800 psig
Cylinder Volume: 28.7 ft³
Valve Outlet Connection: CGA 350
Cylinder Number(s): EA0023428

Fill Date: Recert.
Analysis Date: 4/20/2020

Filling Method: Gravimetric

Analyst: Ronnie Popularas

QA Reviewer: Blayne Griffin

Key to Analytical Techniques:

Reference	Analytical Instrument - Analytical Principle
1	Hewlett-Packard 6890 - Gas Chromatography with FID

The gas calibration cylinder standard prepared by Praxair Distribution, Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Praxair Distribution, Inc. Reference Materials which are either prepared by weights traceable to the National Institute of Standards and Technology (NIST), Measurement Canada, or by using NIST Standard Reference Materials where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted. Analytical uncertainty is expressed as a Relative % unless otherwise noted.

IMPORTANT

The information contained herein has been prepared at your request by personnel within Praxair Distribution, Inc.. While we believe the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.



Customer & Order Information:

PRAXAIR PKG SANTA ANA CA HPS
1545 E EDINGER AVE,
SANTA ANA, CA 92705-4907
Praxair Order Number: 71317148
Customer PO Number: Verbal

Certificate Issuance Date: 4/7/2020

Certification Date: 4/7/2020
Lot Number: 70340 2517 4F
Part Number: NI EO1000P-A3
DocNumber: 197405
Expiration Date: 4/7/2022

CERTIFICATE OF ANALYSIS
Primary Standard

Component	Requested Concentration (Molar)	Certified Concentration (Molar)	Analytical Reference	Analytical Uncertainty
Ethylene oxide		1,000 ppm	1	± 1 %
Nitrogen		Balance		

Cylinder Style: A3
Cylinder Pressure @ 70 F: 1100 psig
Cylinder Volume: 30 ft³
Valve Outlet Connection: CGA 350
Cylinder Number(s): CLM002810

Fill Date: Recert.
Analysis Date: 4/6/2020

Filling Method: Gravimetric

Analyst: Ronnie Popularas

QA Reviewer: Jim Maurin

Key to Analytical Techniques:

Reference	Analytical Instrument - Analytical Principle
1	Hewlett-Packard 6890 - Gas Chromatography with FID

The gas calibration cylinder standard prepared by Praxair Distribution, Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Praxair Distribution, Inc. Reference Materials which are traceable to the International System of Units (SI) through either weights traceable to the National Institute of Standards and Technology (NIST) or Measurement Canada, or through NIST Standard Reference Materials or equivalent where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted. Analytical uncertainty is expressed as a Relative % unless otherwise noted.

IMPORTANT

The information contained herein has been prepared at your request by personnel within Praxair Distribution, Inc.. While we believe the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.



Customer & Order Information:

PRAXAIR PKG SANTA ANA CA HPS
1545 E EDINGER AVE,
SANTA ANA, CA 92705-4907
Praxair Order Number: 71317148
Customer PO Number: Verbal

Certificate Issuance Date: 4/7/2020

Certification Date: 4/7/2020
Lot Number: 70340 2517 4F
Part Number: NI EO10000P-A3
DocNumber: 197406
Expiration Date: 4/7/2022

CERTIFICATE OF ANALYSIS
Primary Standard

Component	Requested Concentration (Molar)	Certified Concentration (Molar)	Analytical Reference	Analytical Uncertainty
Ethylene oxide		10,100 ppm	1	± 1 %
Nitrogen		Balance		

Cylinder Style: A3
Cylinder Pressure @ 70 F: 600 psig
Cylinder Volume: 30 ft³
Valve Outlet Connection: CGA 350
Cylinder Number(s): CLM005787

Fill Date: Recert.
Analysis Date: 4/6/2020

Filling Method: Gravimetric

Analyst: Ronnie Populargas

QA Reviewer: Jim Maurin

Key to Analytical Techniques:

Reference	Analytical Instrument - Analytical Principle
1	Hewlett-Packard 6890 - Gas Chromatography with FID

The gas calibration cylinder standard prepared by Praxair Distribution, Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Praxair Distribution, Inc. Reference Materials which are traceable to the International System of Units (SI) through either weights traceable to the National Institute of Standards and Technology (NIST) or Measurement Canada, or through NIST Standard Reference Materials or equivalent where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted. Analytical uncertainty is expressed as a Relative % unless otherwise noted.

IMPORTANT

The information contained herein has been prepared at your request by personnel within Praxair Distribution, Inc.. While we believe the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.



CERTIFICATE OF ANALYSIS

Customer Name: Environmental Compliance Specialists, Inc
Stock / Analyzer Tag #: A006-1040-50PNC
Customer Reference: Verbal Dan
MESA Reference: 124691
Date of Certification: 4/21/2021
Recommended Shelf Life: 2 Years

Cylinder Number: CAL-4448
Product Class: Certified Standard
Cylinder Contents (1): 28 CF @ 2000 PSI
Cylinder CGA: A006-HP-350/BR
Analysis Method: GC-TCD
Preparation Method: Gravimetric

Component	Requested Concentration (2)	Reported Concentration (2,3)
Ethylene Oxide	50 ppm	52 ppm
Nitrogen	Balance	Balance

Authorized Signature: _____

(1) The fill pressure shown on the COA is as originally quoted. The fill pressure measured by the customer may differ from the fill pressure originally quoted due to temperature effects, compressibility of the individual components when blended together in the cylinder, gauge accuracy or reduction in content volume before shipping as a result of samples withdrawn for laboratory QC necessary to ensure product quality.

(2) Unless otherwise stated, concentrations are given in molar units.

(3) Vapor pressure mixes are blended at a sufficiently low pressure so as to eliminate phase separation under most low temperature conditions encountered during transport or storage. However, it is generally recommended that cylinders containing vapor pressure restricted mixes be placed on the floor in a horizontal position and rolled back and forth to improve homogeneity of the gas phase mixture before being put into service.

Analytical Gas Standards are prepared and analyzed using combinations of NIST traceable weights, SRM's provided by NIST, or internal gas standards that have been verified for accuracy using procedures published by the US-EPA. Pure gases are analyzed and certified for purity using minor component Analytical Gas Standards prepared according to the methods specified above. Balances are calibrated to NIST test weights covered by NIST test number 822/278982-10. Reference Certification #'s: 1072/Z, 833/AB and 3280/H.

Calibration methods are in conformance with MIL-STD 45662A.

MESA Specialty Gases & Equipment

division of MESA International Technologies, Inc.
2427 S. Anne St. • Santa Ana, California 92704 • USA
TEL: 714-434-7102 • FAX: 714-434-8006 • E-mail: mail@mesagas.com
On-line Catalog at www.mesagas.com

APPENDIX G

Process Data

TIME	PRESS INHGA	TEMP (DEG F) AVG	RH %	VAP GAS	ETO MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
14:01	3.5	118		93	0	39.5		
MAX:	4.0	120		163	0	40.8	PHASE 1:00	PHASE ELAPSED 1:00
MIN:	3.5	118		93	0	25.4		CYCLE 2:25

GAS A (EO) PHASE

14:01	3.5	118		93	0	39.5	===== STERILANT 1 =====	
14:02	4.6	118		94	0	42.2		
14:03	5.6	118		85	61	48.1		
14:04	6.6	118		83	133	49.7		
14:05	7.6	118		87	199	51.5		
14:06	8.7	118		89	256	53.2		
14:07	9.5	118		89	313	54.7		
14:08	10.6	118		93	370	56.2		
14:09	11.6	118		97	427	57.6		
14:10	12.6	118		100	484	58.7		
14:11	13.6	118		103	533	59.8		
14:12	14.6	118		105	591	61.2		
14:13	15.7	118		107	648	62.1		
14:14	16.7	118		108	703	63.3		
14:14	17.0	118		107	719	63.3		
MAX:	17.0	118		108	719	63.3	PHASE 0:13	PHASE ELAPSED 0:13
MIN:	3.5	118		83	0	39.5		CYCLE 2:38

STERILANT USED THIS PHASE: 57.3, CYCLE TOTAL: 57.3

GAS DWELL (EO) PHASE

14:15	17.1	118		106	754	63.0		
14:16	17.1	118		105	750	61.4		
14:17	17.1	118		104	763	60.9		OPERATOR CYCLE ABORT
14:17	17.1	118		104	763	60.8	SHORT EXPOSURE	
14:17	17.1	118		104	763	60.8		
MAX:	17.1	118		106	763	63.0	PHASE 0:01	PHASE ELAPSED 0:01
MIN:	17.1	118		104	754	60.8		CYCLE 2:41

AFTER VACUUM PHASE

14:17	17.1	118		104	763	60.8		
14:17	OPERATOR SENSOR CHECK --			PR	58.8,	RH	0,	JWT 121, VLT 84, VGX 104
	CT1	118,	CT2	118,	CT3	119,	P01	119, P02 FAIL, P03 FAIL, P04 88
	P05	88,	P06	88,	P07	88,	P08	88, P09 88, P10 88, P11 88
	P12	88,	P13	88,	P14	88,	P15	88, P16 88, P17 88, P18 88
	P19	88,	P20	88,	ETO	763,	H2O	60.8, WT 363.0
14:17	*SYSTEM OPERATION VERIFIED							
14:19	15.0	118		103	686	54.9		

14:37	2.0	117	96	105	15.0	===== RELEASE 1 =====								
14:39	4.1	117	97	123	16.5									
14:39	5.1	117	97	117	15.8	OPERATOR CYCLE STOP								
14:41	5.1	117	97	106	14.8									
14:43	5.1	117	95	100	14.5									
14:45	5.1	117	95	100	14.5									
14:47	5.1	117	95	100	14.6									
14:49	5.1	117	94	100	14.9									
14:51	5.1	117	94	100	15.0									
14:53	5.1	117	93	100	15.0									
14:54	5.1	117	93	100	15.0	CYCLE STILL STOPPED								
14:55	5.1	117	93	100	15.0									
14:57	5.1	117	93	100	15.0									
14:59	5.1	117	92	100	15.0									
15:01	5.1	117	92	100	15.2									
15:03	5.1	117	92	100	15.3									
15:05	5.1	118	92	100	15.5									
15:07	5.1	118	92	100	15.5									
15:09	5.1	118	92	100	15.3									
15:09	5.1	118	92	100	15.5	CYCLE STILL STOPPED								
15:11	5.1	118	91	100	15.5									
15:13	5.1	118	91	100	15.6									
15:15	5.1	118	91	100	15.7									
15:17	5.1	118	91	100	15.9									
15:19	5.1	118	91	100	15.9									
15:20	OPERATOR SENSOR CHECK ---		PR	17.4,	RH	0,	JWT	124,	VLT	86,	VGX	91		
	CT1	118,	CT2	118,	CT3	119,	P01	119,	P02	FAIL,	P03	FAIL,	P04	87
	P05	87,	P06	87,	P07	87,	P08	87,	P09	87,	P10	87,	P11	87
	P12	87,	P13	87,	P14	87,	P15	87,	P16	87,	P17	87,	P18	87
	P19	87,	P20	87,	ETO	100,	H2O	15.9,	WT	363.0				
15:20	SYSTEM OPERATION VERIFIED													
15:20	5.1	118	91	100	15.9	CYCLE CONTINUED								

13. Phase » EO Dwell

Date / Time	[°F] Avg. Chamber Gas Temp	[inHg] Current Pressure	[mg/l] EO Conc. Current	[lbs] EO Weight Used	[mg/l] Calc. AH	[%] RH Sensor
16-Sep-21						
14:28:44	119.0	17.0	724.2	0.0	41.8	N/A
14:29:44	119.0	17.0	724.3	0.0	41.8	N/A
14:30:44	119.0	17.0	724.3	0.0	41.4	N/A
14:31:44	119.0	17.0	724.2	0.0	41.4	N/A
14:32:44	118.9	17.0	724.2	0.0	41.8	N/A
14:33:44	118.9	17.0	724.2	0.0	41.8	N/A
14:34:44	118.9	17.0	724.3	0.0	41.4	N/A
14:35:44	118.9	17.0	724.2	0.0	41.4	N/A
14:36:44	118.8	17.0	726.5	0.0	41.4	N/A
14:37:44	118.8	17.0	724.3	0.0	41.8	N/A
14:38:40	118.8	17.0	724.3	0.0	41.8	N/A

Step Gas Usage

ID	Gas	Drum S/N	Lot Number	Usage Value
3,060	EO	E006043	UTLX930289G21	0.0lbs

Device	Summary	Summary Value		Specified Range
In-Spec. Time	Final	00:14:57		04:00:00 - 04:30:00
Total Phase Time	Final	00:14:57		n/a - N/A
TempAve	Min	118.8	°F	115.0 - 125.0 °F
TempAve	Max	119.1	°F	115.0 - 125.0 °F
PCurr	Min	17.0	inHg	16.5 - 18.0 inHg
PCurr	Min	17.0	inHg	n/a - 17.5 inHg
PCurr	Max	17.0	inHg	16.5 - 18.0 inHg
PCurr	Max	17.0	inHg	n/a - 17.5 inHg
RH Calc.	Min	N/A	%	N/A - N/A %
RH Calc.	Max	N/A	%	N/A - N/A %
AH Conc.	Min	41.4	mg/l	n/a - N/A mg/l
AH Conc.	Max	42.3	mg/l	n/a - N/A mg/l
EO Conc.	Min	721.1	mg/l	N/A - N/A mg/l
EO Conc.	Max	726.5	mg/l	N/A - N/A mg/l
EO Weight Used	Final	0.0	lbs	N/A - N/A lbs
DVN In-Spec. Time has a measurement value of 00:14:57. The min specified value is 04:00:00				

14. Phase » Vacuum

(Phase No.12)

Date / Time	[°F] Avg. Chamber Gas Temp	[inHg] Current Pressure
16-Sep-21		
14:38:40	118.8	17.0
14:39:41	118.7	15.5
14:40:41	118.6	14.5
14:41:41	118.4	13.6
14:42:41	118.3	12.7
14:43:41	118.1	11.7
14:44:41	117.9	10.7
14:45:41	117.9	9.7

CHAMBER #2
RUN #2
GAS 54.7 LBS

...

14. Phase » Vacuum

Date / Time	[°F] Avg. Chamber Gas Temp	[inHg] Current Pressure
16-Sep-21		
14:46:41	117.7	8.9
14:47:41	117.6	7.9
14:48:41	117.5	7.0
14:49:41	117.4	6.1
14:50:41	117.3	5.4
14:51:41	117.2	4.7
14:52:41	117.2	4.2
14:53:41	117.2	3.7
14:54:41	117.2	3.3
14:55:41	117.2	2.9
14:56:30	117.2	2.7
14:56:30	117.2	2.7
CUS Michael Croce Jr selected the CAL function: cal		
14:56:41	117.2	2.6
14:57:41	117.2	2.4
14:58:41	117.2	2.1
14:59:21	117.3	2.0
14:59:23	117.3	2.0

Device	Summary	Summary Value		Specified Range
In-Spec. Time	Final	00:20:43		00:13:00 - 01:00:00
Total Phase Time	Final	00:20:43		n/a - N/A
TempAve	Min	117.2	°F	110.0 - 130.0 °F
TempAve	Max	118.8	°F	110.0 - 130.0 °F
PCurr	Final	2.0	inHg	1.5 - 2.5 inHg
PCurr	Final	2.0	inHg	n/a - N/A inHg

15. Phase » Nitrogen Inject

(Phase No.13 - 1)

Date / Time	[°F] Avg. Chamber Gas Temp	[inHg] Current Pressure	[mg/l] EO Conc. Current
16-Sep-21			
14:59:23	117.3	2.0	82.2
15:00:24	117.4	3.1	89.1
15:01:24	117.6	4.1	93.6
15:02:24	117.8	5.1	93.6
15:03:24	117.9	5.1	82.2
15:04:24	118.0	5.1	80.0

Device	Summary	Summary Value		Specified Range
TempAve	Min	117.3	°F	110.0 - 130.0 °F
TempAve	Max	118.0	°F	110.0 - 130.0 °F

...

13. Phase » EO Dwell**Step Gas Usage**

ID	Gas	Drum S/N	Lot Number	Usage Value
3,049	EO	E000836	UTLX930289G21	0.0lbs

Device	Summary	Summary Value		Specified Range
In-Spec. Time	Final	00:00:33		04:00:00 - 04:30:00
Total Phase Time	Final	00:00:33		n/a - N/A
TempAve	Min	118.6	°F	115.0 - 125.0 °F
TempAve	Max	118.6	°F	115.0 - 125.0 °F
PCurr	Min	16.9	inHg	16.5 - 18.0 inHg
PCurr	Min	16.9	inHg	n/a - 17.5 inHg
PCurr	Max	17.0	inHg	16.5 - 18.0 inHg
PCurr	Max	17.0	inHg	n/a - 17.5 inHg
RH Calc.	Min	N/A	%	N/A - N/A %
RH Calc.	Max	N/A	%	N/A - N/A %
AH Conc.	Min	65.1	mg/l	n/a - N/A mg/l
AH Conc.	Max	65.5	mg/l	n/a - N/A mg/l
EO Conc.	Min	726.1	mg/l	N/A - N/A mg/l
EO Conc.	Max	730.7	mg/l	N/A - N/A mg/l
EO Weight Used	Final	0.0	lbs	N/A - N/A lbs
DVN In-Spec. Time has a measurement value of 00:00:33. The min specified value is 04:00:00				

14. Phase » Vacuum

(Phase No.12)

Date / Time	[°F] Avg. Chamber Gas Temp	[inHg] Current Pressure	CH E RUN #3 GAS 64.2 LBS	
16-Sep-21				
15:01:13	118.6	16.9		
15:02:14	118.6	16.0		
15:03:14	118.6	14.9		
15:04:14	118.5	13.9		
15:05:14	118.5	13.0		
15:06:14	118.5	11.9		
15:07:14	118.4	10.9		
15:08:14	118.4	9.9		
15:09:14	118.3	8.9		
15:10:14	118.3	7.9		
15:11:14	118.3	6.9		
15:12:14	118.2	5.9		
15:13:14	118.1	5.0		
15:14:14	118.1	4.0		
15:15:14	118.1	3.2		
15:16:14	118.1	2.6		
15:17:14	118.1	2.1		
15:17:32	118.0	2.0		
15:17:34	118.0	2.0		

...

14. Phase » Vacuum

Device	Summary	Summary Value		Specified Range
In-Spec. Time	Final	00:16:21		00:13:00 - 01:00:00
Total Phase Time	Final	00:16:21		n/a - N/A
TempAve	Min	118.0	°F	110.0 - 130.0 °F
TempAve	Max	118.6	°F	110.0 - 130.0 °F
PCurr	Final	2.0	inHg	1.5 - 2.5 inHg
PCurr	Final	2.0	inHg	n/a - N/A inHg

15. Phase » Nitrogen Inject

(Phase No.13 - 1)

Date / Time	[°F] Avg. Chamber Gas Temp	[inHg] Current Pressure	[mg/l] EO Conc. Current
16-Sep-21			
15:17:34	118.0	2.0	96.8

Device	Summary	Summary Value		Specified Range
TempAve	Min	118.0	°F	110.0 - 130.0 °F
TempAve	Max	118.0	°F	110.0 - 130.0 °F

Loop Summary**Repetition Count: 1**

Device	Summary	Summary Value		Specified Range
Loop count	Final	1		2 - 2
Loop Duration	Sum	00:00:00		n/a - See Subphase
TempAve	Min	118.0	°F	n/a - See Subphase
TempAve	Max	118.0	°F	n/a - See Subphase
PCurr	Min	2.0	inHg	n/a - See Subphase
PCurr	Max	2.0	inHg	n/a - See Subphase
WRN Loop Count has not been met. Loop setpoint is 2 and repetition count is 1				

Queensbury Scrubber Performance Test Operating Conditions

Date: 16 September 2021

Record the following:

Scrubber Operating Parameters

Total gallons in primary and secondary (gal.): 9100
Secondary reactor tank level (Tank 1) (in.): 153
Scrubber Liquor pH: 0.9
Scrubber glycol concentration*: 33%

Operations:

Test Run 1 Chamber #: 1
Test Run 2 Chamber #: 2
Test Run 3 Chamber #: E

Lance Hart

16 Sept 2021

Signature

Date

*Sampled onsite with internal refractometer